

JOURNAL

OF THE

PHILADELPHIA COLLEGE OF PHARMACY.

OCTOBER, 1833.

ORIGINAL COMMUNICATIONS.

ART. XXXI.—On *Chenopodium anthelminticum*.

By R. EGLESFELD GRIFFITH, M. D.

Nat. Ord. CHENOPODEÆ.

Sex. Syst. PENTANDRIA DIGYNIA.

CHENOPODIUM. *Calyx*, five-parted, with five angles. *Corolla*, none. *Style*, bifid, (rarely trifid.) *Seed* one, lenticular, horizontal, covered by the closing calyx.—Nuttall.

C. anthelminticum. *Leaves* oblong-lanceolate, sinuate and dentate, rugose. *Racemes* naked. *Style* one, three-cleft.—Elliot.

Synon. *Botrys prealta frutescens*. Clayt. Virg. 145. Gron. Virg. No. 39.

Chenopodium lycopi-folio, perenni. Dill. Hort. Eltham. 77.

Chenopodium anthelminticum. Lin. Sp. Pl. 320. Willen. Sp.

Pl. 1304. Pursh. Fl. Am. Sep. 1. p. 198, &c. &c. &c.

Icon. Dillen. Hort. Eltham. t. 66. f. 76. Barton, Mat. Med. U. S. 2. t.

44. Rafinesque, Med. Flor. 1. t. 21.

Common Names. Jerusalem oak. Wormseed. Wormseed Goosefoot. Stinkweed &c.

Pharm. Name. Chenopodium. U. S.

Offical, Seeds. Small, irregularly spherical, dull greenish yellow or brownish, with a bitterish somewhat aromatic pungent taste, and peculiar, unpleasant smell.

Description.—Root perennial and branched. Stem upright, herbaceous, much branched, deeply grooved, about two to four feet high. Branches fastigiate, giving the plant a shrubby appearance. Leaves sessile, alternate and scattered, at-

tenuate at each end, with very strongly marked nervures, oval or oblong, deeply sinuate, or dentate, studded beneath with small globular, oleaginous dots. Flowers very small, numerous, of a yellowish green colour, and collected in long axillary, dense, leafless spikes. Calyx monophyllous, with five short oval segments. Corolla none. Styles bifid and sometimes trifid, filiform, longer than the stamina. Stamina opposite to the segments, exserted. Seed small, lenticular, shining, of a dirty yellow or brownish colour, covered by the persistent calyx.

Habitat. This species of *Chenopodium* is found in most parts of the United States, from New England to Florida, and is most abundant and of a larger size to the south. It grows in old fields, along fences by road sides, and in fact in all neglected situations, which have been cleared of trees and underwood for any length of time; it is never met with in woods or on mountains. It also grows freely in France and other parts of Europe, having become almost naturalized in some situations.

It begins to flower about the latter part of June, or beginning of July, and continues in inflorescence until September, or even later. The seeds may be gathered from August to the middle of October. It is sometimes, though not commonly cultivated, as the wild plants occur in sufficient abundance to supply the demand for it as a therapeutic agent.

Botanical History.—The generic name is derived from two Greek words, signifying goose foot, from a fancied resemblance between the leaves of some of the species, to the web foot of that bird. None of the species possess any beauty, and are most generally inert; all the inodorous kinds may be eaten, and form a good substitute for spinach, sometimes, however, acting gently on the bowels. The maritime species are used for making soda, whilst almost all the odorous kinds are possessed of important medical properties.

The species under consideration was classed with several others of an analogous character, under the now obsolete genus *Botrys*, by the earlier writers on botany, and they, in fact present so many striking peculiarities in their physical and

therapeutical properties, that they might with propriety form a subgenus under that appellation.

Rafinesque is of opinion, that two distinct species are confounded under the name of *anthelminticum*; he has, therefore, given the title of *rugosum*, to that found in the southern and western states. In this we think that he has gone too far, and that he has erected a mere variety, depending on soil and climate, into a species, without sufficient ground for so doing; at all events, if *rugosum* be admitted as a legitimate species, its habitat must be considerably extended, as specimens answering in every respect to Elliott's description, to which he refers, are by no means uncommon in certain localities in New Jersey.

Pursh observes that the *anthelminticum* "grows plentifully in the streets of Philadelphia." This is denied by Dr. W. P. C. Barton, who states that this botanist must have observed carelessly, or he would have ascertained that it is the *ambrosiodes* which is so common in the suburbs of the city. From our own observation, it would appear, that although the latter species is certainly the most abundant in these localities, the *anthelminticum* also occurs in sufficient quantity to warrant the remark made by Pursh.

Medical History.—Many species of the genus *Chenopodium* have at different times been employed in medicine to fulfil various indications, and from the concurrent testimony of the earlier writers as respects the therapeutic properties of some of them, it is evident that in this case, as in many others, we have neglected articles of established efficacy, in the mania that exists for new and more powerful drugs. The vermifuge qualities of the plant under consideration appear to have attracted notice soon after the establishment of British colonies in this hemisphere, and more especially in Virginia, where the first trials with it were made, and it is spoken of by Schæpf, Kalm and others, with various degrees of commendation. Its anthelmintic properties are now universally recognized, and it is admitted as a legitimate article of the *materia medica* into the national pharmacopœia, and the various dispensatories.

Medical Properties.—The *C. anthelminticum* is usually classed among the vermifuge remedies, and although it has been advantageously employed as an antispasmodic, no writer on our native materia medica has noticed its powers in this respect, although they are of a much higher order than those of its kindred species, the *ambrosiodes*, which has been so successfully used in chorea, and other deranged states of the nervous system. Plenck gives the result of his experiments with this latter in five or six cases of chorea, which had resisted the usual modes of treatment, in which a complete cure was effected by a decoction of it; its success in this obstinate disease is amply confirmed by subsequent writers, and we have every reason to believe that still more important results would attend the employment of the *anthelminticum*, under similar circumstances.

Pharm. Preparations, and Mode of Administration.—As an anthelmintic, it is given in a variety of forms, as the expressed juice of the whole plant, an electuary of the seeds, a decoction of the leaves in milk, the essential oil extracted from the seeds, and even in tincture.

Although there can be no doubt of the value and efficiency of these preparations, they are not employed at the present day as generally as *Spigelia*, and other articles of the vermifuge class; this, in all probability, is owing to the nauseous taste inherent to every preparation that can be made, rendering it exceedingly difficult to induce children to swallow a second dose.

When the expressed juice is employed, it should be prepared from the fresh plant, as near the time at which it is to be administered as possible, as it loses much of its efficacy by keeping. The dose is a table spoonful on an empty stomach, morning and evening; to be repeated till the desired result is obtained. The decoction in milk is made by boiling a handful of the leaves in new milk; the dose of this is about a wine-glass full, taken in the same manner as the expressed juice. When used in the form of an electuary, the seeds are to be pulverized and well mixed with honey or molasses; this is the most objectionable form in which the remedy is adminis-

tered, as the quantity of seed required to act on the worms is so great as to produce nausea in many cases.

The best form is, indisputably, the essential oil, as whilst it possesses the advantage of containing the active properties of the plant in the smallest possible compass, it at the same time is not more offensive to the palate or stomach than the other preparations. This oil is generally obtained from the seeds by distilling in a water-bath; but we have every reason to believe that it would be more advantageous to use the whole plant for this purpose, as the leaves contain full as much of the volatile oil as the seeds. When pure, it is of a light straw colour, possessing the peculiar odour of the plant in an eminent degree, and is very pungent and even acrid to the taste. As met with in commerce, it is often adulterated with oil of turpentine, or some other essential oil.

The dose for a child of two years of age, is from five to ten drops, three times a day, increasing the quantity in proportion to the years. The best mode of giving it, is to drop the oil on a lump of sugar, which is then to be grated into as much water as it will render highly pungent; taking care with very young children not to make the dose too stimulating. It should always be administered on an empty stomach, and after half a drachm to a drachm has been taken, the child is to be gently purged with castor oil or calomel.

As regards the tincture, we know but little. Kalm, however, states that it was the favourite mode of exhibiting it in some parts of the country, and that the results were highly satisfactory.

ART. XXXII.—*On the Metals known to the Aborigines of N. America.* By JACOB GREEN, M. D. *Professor of Chemistry in Jefferson Medical College.*

THE following particulars, respecting certain metallic substances discovered in the ancient graves of our aborigines, have been collected together, with a hope that they may throw an additional ray of light on the dark history of that mysterious race, which once inhabited along the banks of our great western rivers.

It is commonly supposed that those nations who obtained their sustenance by agriculture, were the first to devote much attention to the mechanic arts, and that they were therefore the first to discover the processes of metallurgy. Those who wander from place to place and live by hunting and fishing, might readily substitute for metals, sharpened flints and shells, thorns, and the bones of fish and other animals. Whether the people who constructed the fortifications and mounds of the west, had already passed, in the usual order of civilization, from the hunting to the pastoral state of society, or were just abandoning the pursuits of the chase for the employments of agriculture, are points foreign to this communication; its object, as just stated, being merely to show that they were acquainted with some rude processes of metallurgy.

According to all antiquity, sacred and profane; gold, silver and copper, were the first metals used by man. These facts are exactly what our present knowledge of mineralogy would lead us to expect—for we even now find these metals so pure in nature, that there is no necessity of resorting to melting and refining furnaces in order to render them malleable. We know nothing with certainty of the methods resorted to by the ancient metallurgists, but we have always supposed that the metals used in the first ages of the world were derived from the native substance, accidentally discovered near the surface of the ground, and not by extraction from the ores.

There are several instances mentioned in which small ornaments of *gold* have been found in our ancient tombs. The

following fact will be sufficient for our purpose. Dr. Hildreth, in the *Archæologia Americana*, informs us that in a mound in Ross county, near Chilicothe, a piece of gold was discovered lying in the palm of a skeleton's hand.

The quantity of native gold now obtained from several districts of the United States, renders it highly probable that this metal was not uncommon among the Aborigines. Plates of native gold, beaten out into thin foil, are frequently attached to the mummies in the tombs of the ancient inhabitants of Mexico. These plates are a native alloy of gold and silver, the silver being in such excess as to obscure the lustre of the gold altogether. On analyzing one of these plates, now in the Philadelphia Museum, I found it about fifteen carets fine—no copper could be detected in the alloy. This is the kind of gold, I suppose, known to the ancient North Americans.

The next metal to be noticed is silver. Near the mouth of the Muskingum, there are a number of old fortifications. Among the many curious articles found on digging in that place, there were several pieces of silver. This silver had been hammered out into thin plates, one of which was six inches long and two inches broad. It weighed one ounce. I might notice several other instances in which silver has been discovered in our tumuli. In all these cases the metal was no doubt in its native state. Large masses of silver are now met with in Mexico, and smaller portions frequently occur in some of the northern states.

Our third substance is copper. It is known to almost every one, that no metal was more common in ancient times than copper. It often occurs in loose, insulated masses. Not far from Lake Superior there is a large mass of this kind, weighing more than 2000 pounds, from which I have seen some rude utensils and ornaments fabricated by our present race of Indians. Near Somerville, in New Jersey, a lump of native copper, of about 100 pounds weight, was ploughed up a few years since, and I have some specimens obtained from that rich locality, weighing nearly two pounds. From these and other instances which could be specified, it might be expected

that copper would often occur in our ancient mounds. Two or three examples, however, will be sufficient.

Dr. Drake, in his picture of Cincinnati, while noticing the articles dug from the ancient works in the Miami country, enumerates among them "a handful of copper beads, a small oval piece of sheet copper with two perforations, a large oblong piece of the same metal, with longitudinal grooves and ridges. Several copper articles, each consisting of two sets of circular concavo-convex plates." Dr. Hildreth of Marietta, has given us an account of some curious ornaments of copper, taken from the ancient works near that place. The skeleton with which the copper was found, had entirely mouldered away, except a portion of the forehead and skull, which were in contact with the copper: "These bones were deeply tinged with green, and appear to have been preserved by the salts of copper." In the Philadelphia Museum, I have examined a rod of copper, dug out of a mound on the St. Johns river, by Mr. Peale and others; it is about twelve inches in length, is pointed at the ends, and seems much harder than pure copper. When copper supplied the place of iron, the Egyptians had a process of rendering it exceedingly hard. It is also well known that the Peruvians and Mexicans tempered their axes and instruments of war, which were all of this metal, so as to make them a good substitute for iron; and from the appearance of the copper rod found by Mr. Peale, I have no doubt that our Aborigines were acquainted with the same art. That they possessed considerable skill in moulding and working copper is evident, not only from their beads, rings, arrow-heads, and pipes, some of which are said to have been *soldered*, but ornaments of this metal have been found overlaid or plated with silver. These operations certainly imply very considerable advancement in the art of metallurgy. See Atwater's *Antiquities &c.* p. 168.

Besides gold, silver and copper, our Aborigines were also acquainted, in some degree, with iron and lead. Every one knows that the art of working iron is more difficult, and of a later date, than that of the other metals just mentioned. It was, however, of very remote antiquity, though it was con-

finer to particular places. Even as late as the Trojan war, so high a value was set upon it, that a ball of iron was one of the prizes offered by Achilles at the funeral ceremonies in honour of Patroclus. Native iron is not very uncommon, and is usually more malleable and tenacious than the forged metal. The iron mentioned by most ancient writers, and that found in our ancient graves was no doubt the native mineral. In the cabinet of the New York Lyceum, I lately examined a large mass of native iron from Red River, in Louisiana. Its weight exceeds 3000 pounds, it can be easily cut, and is very malleable. At a red heat, fragments of it might readily be beaten into knives and spear heads.

The occurrence of iron in our mounds, manufactured into various utensils, cannot be doubted. Dr. Hildreth states "that a piece of iron ore, which has the appearance of being partially melted, or vitrified, was found in the ancient works on the Muskingum, and that this ore was about the specific gravity of pure iron." It must therefore have been native iron. Mr. Atwater, in the *Archæologia Americana*, mentions several instances in which fragments of iron blades have been found almost wholly converted into oxide. Those ferruginous balls sometimes discovered in the mounds, have been strangely supposed by many to have been cannon balls of iron; but they are merely globular masses of pyrites, or the deuto-sulphuret. They often occur in the alluvial earth, in the western states. I have seen these balls more than a foot in diameter, and so perfectly spherical as to appear very much like the works of art.

The last metal to be noticed is lead. The lead ores of Missouri are so exceedingly rich and abundant, that the vast commercial demands for this metal, might there be supplied for some thousands of years. Though native lead is of very rare occurrence, and is perhaps only found in volcanic regions, there is no ore more readily reduced; indeed, this operation is now constantly performed by the Indians, to obtain balls for their rifles, and for the purpose of ornamenting their tomahawks and pipes. The occurrence of lead, however, in the ruins of our tumuli is not very common. Dr. Drake, in de-

scribing the articles taken from a mound in the city of Cincinnati, mentions "a mass of lead ore," and further remarks that "lumps of lead ore, or galena, have been found in other tumuli." A similar statement is made by Col. Sargent, in the American Philosophical Transactions, vol. iv. p. 205.

From the above particulars it follows, that although we cannot boast much of the skill of our aborigines, in the refinements of metallurgy, still they were undoubtedly familiar with some of the uses of gold, silver, copper, iron and lead; and possessed vastly more knowledge on these subjects than the barbarous tribes who inhabited the same regions two or three centuries since.

ART. XXXIII.—*Essay on the analysis of Mineral Waters, together with a new analysis of Saratoga Water, with the view of ascertaining not only the acids and bases, but the manner in which they are combined, together with a suggestion of the method of imitating other Mineral Waters from their analysis.* By C. C. C. COHEN.

THE analysis of mineral waters, notwithstanding the vast improvements which have been introduced into analysis generally, has been but little advanced since the time of Klaproth; for although it must be admitted that several new substances have been lately discovered in mineral waters, of which before, the very existence was unknown, yet still the same errors inherent in the processes adopted by the earlier chemists is systematically pursued, without an attempt at amendment, by more modern operators, and consequently the same erroneous results obtained; erroneous, not in reference to the substances themselves, but merely in relation to the manner in which the combinations exist in the natural spring. Hence the difficulty of imitating the contents of a spring by attempting to unite the insoluble combinations always generated by the present mode of analysis, and the little success which has hitherto attended those operators who have endeavoured, by synthesis, to form a factitious water at all resembling the original spring. The design of the present essay is to unfold a new method of

examination, and one which it is presumed will give correct results as to the exact state in which substances are combined in the original spring, thereby rendering it easy to be imitated; an advantage not to be lightly estimated by those who live at a great distance from the natural spring.

The difficulties which have been urged against the synthetic proof of a correct examination of mineral waters, resolve themselves into the incapability of determining by chemical analysis the exact combinations formed by the substances existing in the spring, an incapability often maintained with great justness against those who would wish to deduce from analysis the medicinal virtues of a natural spring. With a view to obviate this objection, Dr. Murray, many years ago, suggested the probability that the elements of a mineral water unite under the form of the most readily soluble salts; a theory strongly objected to by an intelligent correspondent of the *Quarterly Journal of Science*, who maintains that "the results of his [Dr. Murray's] own chemical investigations are far more clearly elucidated in the theory which Berthollet has so ably conceived, and which Professor Berzelius, and probably most other chemists, have now embraced, according to the principles of which a common solution of several salts, and hence a mineral water, contains as many different salts as the product of the number of its bases by the number of its acids." *Quarterly Jour. Science*, Jan. to June, 1828—article on Mineral Waters, by Mr. A. Walker.

The following experiments, made with the sole view of elucidating this fact, will prove that notwithstanding the high authority of those who advocate Berthollet's theory, Dr. Murray's opinion on this subject was correct; a circumstance rather remarkable in a chemical speculation formed prior to the exhibition of any facts to maintain it; and here I may be permitted the remark that it appears very strange that the theory of Dr. Murray should not have suggested a simpler method of analysis in preference to the complex one he adopted, a method which it will not be deemed necessary to enlarge on in this article, although it must be censured as the

most operose system yet suggested for a correct analysis of mineral waters.

The experiments I am about to relate will show the correctness of Dr. Murray's theory beyond the possibility of doubt or cavil.

Experiment 1. A solution of muriate of lime containing about $\frac{1}{100}$ of crystallized salt was dropped into an equivalent quantity of an equally dilute solution of the true bicarbonate of soda; no precipitation occurred.

Experiment 2. The solution was heated, an effervescence took place, and a precipitate of carbonate of lime fell down, the upper solution containing muriate of soda.

Experiment 3. Into the solution of experiment 1, thirty times its bulk of highly rectified alcohol was poured; a bulky precipitate fell down without any effervescence occurring, which on examination was found to be pure bicarbonate of soda, the earthy muriate remaining dissolved in the alcoholic solution. Now, from these experiments it is evident, firstly, that no decomposition of the salts takes place in the first experiment, as previous to a decomposition taking place an effervescence occurs, as is shown in experiments 2 and 3, plainly proving that no carbonate of lime existed at that time in the solution.

To be certain, however, of this fact, and to ascertain whether, if carbonate of lime were dissolved in carbonated water and mixed with a solution of muriate of soda, it would operate in like manner with the above solutions: the results were as follows:—

The carbonate of lime was freshly precipitated from the solution of the muriate of lime, washed, and put in contact with the carbonated water while still moist; it readily dissolved; the equivalent proportion of muriate of soda was added.

On adding but a very small proportion of alcohol, an effervescence ensued, and carbonate of lime was precipitated, plainly proving a difference of combination between this solution and the one before made, although containing the same substances in solution; showing an advantage in the means employed for the analysis of the two solutions not possessed

by the ordinary modes of examination. On repeating these experiments frequently since, I have found temperature to materially modify the action, as also the manner, in which the alcohol is added, in some measure to affect the result, but as this promises to afford some curious facts in its investigation, I may, in some future number of your Journal, present your readers with the results of my researches on this subject; but for the present I wish more particularly to proceed to the examination of Congress water, which is the principal subject of this essay.

The following experiments were made some time since with the view of ascertaining the cause of silicium being dissolved in mineral waters, and the results are not a little surprising. A quantity of silicate of soda was dissolved in a large quantity of water, and carbonic acid passed through to supersaturation; during the transmission of the gas a slight precipitate formed, which, however, was totally redissolved on continuing to pass more of the carbonic acid through it.

A quantity of freshly precipitated silex in a gelatinous state, well washed, was diffused through a solution of supercarbonate of soda, carbonic acid was passed through the mixture, and after some time the clear solution was examined and found to contain a notable proportion of silex.

The compound of silex and carbonate of soda in carbonated water is completely decomposed by alcohol, carbonic acid gas flying off, silex and carbonate of soda precipitated.

Convinced by the above results that an analysis of a mineral water might be effected without having recourse to heat, and in such a manner as would enable the experimenter to ascertain the precise combinations which existed therein, I have attempted the analysis of Congress water with the view of ascertaining whether it be not possible to form an exact imitation of the spring containing the same, in the same proportions and in the same combinations as in the original.

The usual preparatory testing differing in nothing from Dr. Steel's memoir, I pass over it and proceed to the analytic examination. In the quantity of carbonic acid, as stated by Dr. Steel, I conceive an error to exist, although I am precluded

from experimentally proving it to be so, as my analysis has been performed on the bottled water sold by Lynch & Clarke. The error consists in his having boiled the water and collected the gaseous products, instead of endeavouring to separate the carbonic acid by some other means; as by boiling, the bicarbonate of soda would be reacted upon by the earthy muriates, and a quantity of its carbonic acid would be evolved, and of course increase the actual quantity of uncombined carbonic acid.

According to Dr. Henry the quantity of carbonic acid taken up by water at the usual pressure of the atmosphere, is its own bulk, and probably the overplus in Dr. Steel's analysis, may be considered as derived from the decomposition of the bicarbonated soda, and consequently in lieu of 311 cubic inches of uncombined carbonic acid in a gallon of water, it should be estimated as 231; the cubic contents of a gallon. I may have an opportunity of verifying this before long, but cannot at present make any further objections than those which analogy apparently correct, at present suggests to me.

Sixteen troy ounces of congress water were mingled with two gallons of highly rectified alcohol 812 in a glass jar and the mixture well agitated: a brisk effervescence was excited and a bulky flocculent precipitate began to fall, which, on being collected and washed with alcohol and dried at a heat of 100 F. weighed $66\frac{1}{2}$ grains. A.

The clear supernatant liquid to which the washings of A were added, was tested with a solution of nitrate of silver containing one drachm of dry nitrate to the ounce, of which 692 grains were used, corresponding to 86.5 grains of pure nitrate, the precipitate thence ensuing, on being collected, washed and dried, weighed 74 grains. B.

The precipitate B digested in liquor of ammonia C, left one grain of insoluble residuum, which, on examination, was found to be iodide of silver. D.

The solution in liquid ammonia C was supersaturated with nitric acid and a precipitate weighing 73 grains E again produced corresponding to 18 grains chlorine.

To ascertain the presence of bromine, I resolved to try the

effect of boiling it with sulphuric acid ; as that acid is decomposed by bromide of silver into sulphuric acid, of which, in order to ascertain the presence I passed the mixed gases (or muriatic acid gas, from the action of sulphurous acid on the chloride of silver, and sulphurous from the same action on any bromide that might be present,) into a solution of muriate of gold, previously freed from any excess of acid, when a brownish film of metallic gold appeared on the surface of the solution, arising from the action of the sulphurous acid on the solution. I was unable to estimate the exact quantity for want of the requisite convenience, but I should estimate it to equal the quantity of iodine present in the water, and I conceive it exists in the state of hydrobromate of magnesia in the water.

The supernatant liquid of precipitate B was evaporated to dryness, and the residuum strongly ignited, it then weighed $12\frac{1}{2}$ grains.

These $12\frac{1}{2}$ grains were dissolved in muriatic acid added to excess, and ammonia was added to neutralize the excess of muriatic acid, so as to leave a portion of muriate of ammonia in solution. Oxalate of ammonia being now added, a precipitate of oxalate of lime fell, which, on being washed, collected and ignited to redness for half an hour, yielded $6\frac{1}{2}$ grains of pure lime. F.

The solution remaining after the separation of the lime, was precipitated by phosphate of soda and ammonia, and a precipitate accrued, which, on being calcined to redness, weighed $14\frac{3}{4}$ grains, corresponding to rather more than six grains of magnesia. G.

2. The precipitate A was now examined ; it was dissolved in two ounces of distilled water : a slight turbidness was evident, arising from the silex diffused through it. Acetic acid was now added, as long as an effervescence was produced ; the loss of weight due to the disengagement of carbonic acid, was 23 grains. A. The precipitation of the silex now took place. It was very small in quantity, and may be estimated at one tenth of a grain. I did not either collect or weigh it, the quantity being so extremely small.

The liquid was now filtered and a solution of acetate of silver added, as long as a precipitate ensued; the precipitate thence resulting was perfectly soluble in liquid ammonia; it weighed $42\frac{1}{2}$ grains *b*.

This precipitate *b* was boiled with sulphuric acid and the gas passed through a solution of muriate of gold, as in the previous experiment, but no reduction of the gold took place, proving the absence of bromine.

The chlorine of precipitate *b* is $10\frac{1}{2}$ grains, which, added to the carbonic acid *a*, 23 grains, will make $33\frac{1}{2}$ grains which, deducted from the original precipitate A $66\frac{1}{2}$ grains, leaves 33 grains still to be accounted for. The solution remaining after precipitate *b* was evaporated to dryness, and the residuum deflagrated with nitrate of ammonia to burn off the acetic acid, when a white porous mass remained which had all the chemical and physical characteristics of pure soda; it was neutralized with sulphuric acid and ignited, when the ignited sulphate weighed 54 grains, corresponded to *c* 24 grains of pure soda. The remaining 9 grains may be fairly assumed as the water belonging to the supercarbonate of soda, and as the moisture not expelled by the low heat to which the original precipitate was exposed.

To sum up, I conceive that congress water is composed of, in 16 troy ounce measures

Chlorine E $18 + b$	10.5	28.5
Iodine D		0.53
Bromine	a trace	
Soda <i>c</i> partly combined with chlorine and partly with carbonic acid		24.00
Magnesia G in the state of chloride		6.00
Lime F	do. do.	6.50
Carbonic acid combined with soda		23.00

Or that their combinations are as follows:—

Chlorine *b* exists in the state of chloride of sodium; consequently 10.5 chlorine would require 7. sodium, corresponding to 9.33 soda, making chloride of sodium 17.5.
Chlorine E exists in the state of earthy chlorides.

Lime 6.50 corresponds to calcium 4.64 and would require 8.37 of chlorine, forming chloride of calcium 13.01.

Chlorine E is 18 grains, from which deduct 8.37, united with the calcium, the remainder is 9.63, requiring 3.21 magnesium, forming chloride of magnesium.

Magnesia G 6 corresponds to magnesia 3.6, from which deduct 3.21, magnesium combined with chlorine remains 0.39, magnesium nearly sufficient to unite with iodine 0.53. The trace of bromine has likewise a share of this magnesium, and the error is probably owing to loss in the examination.

Soda c 24 from which deduct .7 sodium united with chlorine corresponding to 9.33, soda $24 - 9.33 = 14.66$ to combine with 23 carbonic acid. This carbonic acid is too much nearly by 3, an excess probably arising from the method of estimating it; correcting this error by the atomic theory, it would stand thus:—

Bicarbonate of soda, consisting 14.66 soda, 20.16 carbonic acid, and 4.12 water, forming 38.94, and the water may be imitated by

	<i>grs.</i>
Chloride of sodium	17.5
magnesium	12.84
calcium	13.01
Iodide of magnesium about	1.00
Silex	.10
Bromide do.	a trace
Bicarbonate of soda	$38.94 = 83.39$ grs.

in 16 ounces troy, with an atmosphere of carbonic acid gas injected into a soda water fountain, and the requisite degree of spring given by an atmosphere or two of common air, an imitative water exactly analagous in its chemical and physical properties may be obtained.

N. B. Since the above analysis was performed I have discovered on the sides of the bottle in which the congress water was kept, a quantity of carbonate of iron. I did not estimate it, but I suspect Dr. Steel's estimate may be right of the quantity; but if iron exists in the original spring, I am inclined to think, in consequence of its ready decomposition by standing, that it exists in the state of iodide, and in this I am

the more inclined to retain my opinion from the fact that iodide of iron is, after some time standing, decomposed by bi-carbonate of soda. In the spring we may suppose that this decomposition takes place, and that the muriate of magnesia and hydriodate of soda mutually decompose each other. The iodide of iron is besides one of the most soluble salts known.

Addenda. I shall keep on hand, for sale, the above mixture, at a moderate price, to which I recommend to add eight grains of carbonate of iron to each mixture for the gallon, as it is not likely that I shall have an opportunity of examining the spring, to ascertain whether it exists in the state of iodide.

ART. XXXIV.—*Process for the extemporaneous evolution of Iodine.* By ROBERT HARE, M. D., *Professor of Chemistry in the University of Pennsylvania.*

HEAT to the temperature of ebullition nearly, about two ounces of concentrated sulphuric acid, in a glass globe like that represented in the following figure.



It is preferable to have the whole of the globe heated by suspending it, with due caution, over a large charcoal fire. Then quickly transferring it to the iron tripod, previously heated, and furnished with a small bed of hot sand, throw into the acid about half a drachm of iodide of potassium, or sodium, sometimes called hydriodate of potash or soda. Instantaneously the cavity of the globe will become replete with the splendid violet vapour of iodine, which will soon after condense on those portions of the glass which are first refrigerated, in crystals symmetrically arranged, of great beauty, and unusual size.

It is perhaps more convenient, as respects the manipulation, to have the globe suspended by a crane like that used for the suspension of large kettles, rendering it easy by a circular motion to swing them on or off the fire. By similar management the globe may be first kept over the fire till sufficiently hot, and then swung off to receive the salt. A method more attainable in the small way, is that of placing the vessel employed in a small iron skillet, in which it may be made steady by sand. Thus prepared, it may in the first place be conveniently held over the fire, and afterwards transferred to a table and supported without removing it from the skillet.

ART. XXXV.—*Improved Apparatus for showing the spontaneous combustion of Phosphorus in Chlorine.* By the author of the preceding communication.

In my Compendium, I have given an engraving and description of an apparatus for the combustion of phosphorus in chlorine, so contrived as to prevent the odious fumes from reaching the spectators. Subjoined will be found another apparatus, constructed about three years since, by which the process is rendered still more manageable.



Suppose a cylindrical glass vessel, (see figure annexed) eight or nine inches in diameter, and about a foot in height, with a neck about four inches high, and one and a half inches in bore; the whole resembling a large decanter, without a bottom. About the orifice of the neck, let there be cemented air tight, a brass cap surmounted by a stuffing box, and having on one side a hole communicating with the cavity of the neck; this aperture must be furnished with a thumb screw, by which it may be opened or closed at pleasure. Through the stuffing box, a copper rod passes, at the lower end of which a glass or leaden stopple is so affixed as to close the lower part of the neck, into which it is ground to fit air tight. Over this stopple, a cup of copper is soldered, so as to be concentric with the rod. The rod terminates above in a handle. Within the cup, let ten or fifteen grains of phospho-

rus be placed. This is easily effected when the cup and plug are depressed into the lower part of the cavity of the vessel, by a suitable movement of the sliding rod. In the next place draw up the cup and plug into the neck so as nearly, but not entirely to close the neck, and sink the vessel into the water of the pneumatic cistern until all the air below the neck is expelled through the hole in the side of it, which is then to be closed by means of the screw, and the plug twisted and drawn into its place, so as to be air tight. After filling the body of the vessel thus, with water, place it upon the shelf of the cistern. Chlorine may now be allowed to occupy three-fourths of the space within the vessel below the plug. The process being so far advanced, it is only necessary, at the moment when it is desirable to produce the combustion, to depress the plug, and of course the cup associated with it, containing the phosphorus, into the cavity replete with the chlorine. The phosphorus soon burns actively, although with a feeble light.

The increased temperature consequent to the combustion, causes the gas to expand, but not so much as to become too bulky to be retained.

In this case, the chlorine forms a chloride of phosphorus, which meeting with water is decomposed into phosphoric and muriatic acids. By transferring the vessel after it is supplied with chlorine, to a clean porcelain or glass dish, covered by pure water, the products of this combustion might be saved, and would of course increase in proportion to the quantity of phosphorus and chlorine employed. On a larger scale, this process might be resorted to advantageously for the production of phosphoric acid, which is produced when the proportion of chlorine is sufficient; say four cubic inches for every grain of phosphorus.

ART. XXXVI.—*Experiments on Nicotiana Tabacum and Nicotine.* By JOSEPH C. TURNPENNY.

(*Extracted from Inaugural Thesis.*)

IN order to illustrate the properties of tobacco, and its proximate principle nicotine, I have carefully performed the following experiments.

Experiment 1. To half a pound of green tobacco, freshly gathered from the plants, eight ounces of pure water were added, in which it was digested three days; after which it was subjected to filtration and pressure. To the liquor thus obtained, about half a drachm of recently calcined magnesia was added, in order to discharge the nicotine from its natural combination in the plant.

This infusion was then boiled a few minutes after the addition of the magnesia; when cold the clear liquor was decanted. While hot, the smell of tobacco was much more decided than a decoction of the same would have been without the addition of magnesia. The decanted liquor was introduced into a retort and submitted to distillation by the aid of an oil bath, temperature about 300° Fahrenheit; the nicotine passed over with the water, giving to it a slight amber colour. It commenced passing at the temperature of 260°, and its passage was very rapid at 325°. In operating on green tobacco, the process is much retarded by the presence of substances giving to the infusion a disposition to froth, and to throw itself into the neck of the retort. The amber coloured liquor was strongly characterized by the odour of the purest kind of tobacco, and when agitated with sulphuric ether, (62° Baumé) after decantation and evaporation, yielded a few grains of a slight yellow extract about the consistence of molasses, having a powerful odour of tobacco, sufficiently strong to excite, with energy, the nasal organ. The substance above described restores the blue colour of litmus paper reddened by an acid, and turns curcuma paper to a red; it forms combinations with acids in which its odour is restored. It is

unquestionably nicotine, slightly coloured by volatile colouring matter present in the plant.

Experiment 2. Half a pound of green tobacco was subjected to digestion in eight ounces of water, acidulated with half a drachm of sulphuric acid. After three days, this was subjected to filtration and pressure, and the liquor treated with sufficient calcined magnesia to neutralize the acid. It was then submitted to distillation by the aid of an oil bath, the process being in all respects similar to the one already detailed in experiment No. 1; the result corresponding precisely with the former experiment.

Experiment 3. Half a pound of dry leaves of Kentucky tobacco was digested four days in pure water, at the temperature of 70° Fahrenheit, after which it was strained, and the residue strongly pressed; a highly coloured liquor charged with tobacco was obtained, of specific gravity 1048.04; to which, when raised to the temperature of about 180° Fahrenheit, one drachm of calcined magnesia was added, and the whole was agitated. After standing at rest, it was carefully decanted, and the clear liquor submitted to distillation by the aid of an oil bath, at the temperature of 309° Fahrenheit. The distillation was effected with comparative facility, and resulted in the production of a fluid, amber coloured, and highly impregnated with the odour of tobacco. The residue, after distillation, which was suffered to cool in the retort, was of the consistence of molasses, and presented on the sides of the vessel a few granular crystals, formed either by the usual salts contained in tobacco, or some new compound occasioned by the introduction of magnesia.

The amber coloured liquor, when treated with sulphuric ether of 62° Baumé, afforded by evaporation a substance of the consistence of honey, very slightly coloured, and powerfully impregnated with the odour of tobacco; this, when evaporated nearly to dryness, yielded a granular mass.

Experiment 4. The dried leaves of Kentucky tobacco, in quantity the same as in experiment 3, were submitted to water acidulated with sulphuric acid; after digesting four days, at the temperature of 70° Fahrenheit, the liquor was separated,

and more than sufficient calcined magnesia added to neutralize the sulphuric acid. The clear liquor was submitted to distillation by the means of an oil bath, as in the last experiment, and the amber coloured liquor was obtained, affording by the use of ether, the same product as there detailed.

Experiment 5. The aromatic substance obtained by ether from the distilled amber coloured liquors was combined with diluted sulphuric, hydrochloric, tartaric, oxalic and acetic acids; in each of the saline compounds, the aromatic odour was decidedly controled by the acid, and almost suppressed in the sulphate, oxalate and tartrate. When evaporated nearly to dryness, in several of the salts granular formations occurred, but no well defined crystals.

Experiment 6. The concentrated infusion of tobacco, as directed by the Edinburgh Dispensatory, was submitted to distillation by means of an oil bath, a liquor was obtained of a light amber colour, charged with the peculiar aroma of tobacco; (not so decidedly as that obtained after the introduction of calcined magnesia into the infusion, in a previous experiment,) this liquor changed curcuma paper to a light brown, which a diluted acid restored to its original colour. Litmus paper, reddened by an acid, was also restored by this liquor to its original colour. Tincture of nut-galls produced a copious light yellow precipitate.

This liquor, after remaining forty-two days, had not in the least changed its appearance. It is difficult to account for the substance said to have been produced by Hambstadt in the experiments alluded to by the Edinburgh Dispensatory; particularly as the nicotine is very soluble in water, and does not crystallize.

Experiment 7. The products from the infusions of tobacco were submitted to distillation after having been nearly exhausted by sulphuric ether, of 62° Baumé, were saturated with dilute sulphuric acid, and then evaporated at the temperature of 212° Fahrenheit; a thick coloured extract was the result with traces of crystalline forms—this extract, when perfectly dry, was submitted to anhydrous alcohol, (about 40° Baumé) from which the sulphate of Nicotine was obtained in solution,

and a small portion of sulphate of ammonia, in distinct crystals, were left undissolved. The ammonia resulted from the reaction of the magnesia on a salt of ammonia contained in the infusion of tobacco, and its combination with sulphuric acid from the addition of the latter previous to the evaporation above alluded to.

The following experiments illustrate the physiological character of nicotine, and although foreign to the science of pharmacy, I consider of sufficient interest to be recorded.

Experiment 8. About one-sixteenth of a grain of hydrochlorate of nicotine was given to a healthy mouse. The symptoms which immediately ensued were violent spasms of the limbs and body, laborious breathing, great prostration, nausea, inclination to sleep, pupils largely dilated, weakness in the extremities, especially the posterior, and in the course of a few hours the animal died.

Experiment 9. To a healthy mouse, a minute portion of the oxalate of nicotine was given on the point of a large needle; a narcotic effect was immediately produced—laborious breathing and vomiting. In the course of half an hour the animal recovered.

Experiment 10. To a half grown healthy cat, about one-eighth of a grain of the hydrochlorate of nicotine, dissolved in water, was given. An almost instantaneous evidence of the influence of a powerful narcotic was manifested, followed by prostration, with nausea and vomiting—first, the contents of the stomach, then frothy mucus, with violent retching. The head was inclined downwards, and the pupils dilated. The animal having vomited five or six times, gradually recovered, and appeared perfectly well thirty minutes after the exhibition of the nicotine.

Experiment 11. To the same cat about half a grain of the hydrochlorate of nicotine was given, dissolved in water; all the symptoms of a narcotic character evinced as before, were now manifested in the most aggravated form; the ears were drawn closely down upon the back of the head, she made one or two efforts to walk, when she fell, in a state of the greatest prostration, with slight convulsions of the posterior extremities;

evacuation of the contents of the rectum, the ears recovering their natural position, but not their sensibility to the touch; the posterior extremities seemed no longer to be under her control; being thrown in an opposite direction to that of the anterior, thereby giving a spiral twist to the back; pupils fully dilated; squinting of the eyes, turned upwards and outwards; alternately laborious, hurried breathing, with rattling in the lungs and deep inspirations. In this apparently dying state, she laid about thirty minutes, after which she gradually recovered, making violent efforts to vomit, ejecting small quantities of frothy mucus. In the space of sixty minutes she had command of her extremities, but still manifested inclination to coma, with want of appetite. In about three hours, she had entirely recovered, with the exception of great weakness, and took food with avidity.

ART. XXXVII.—*Experiments on Galipœa Officinalis.*

By THOMAS J. HUSBAND.

(*Extract from Inaugural Thesis.*)

A DECOCTION of the bark was treated with subacetate of lead until it ceased to produce a precipitate. This precipitate was separated, and the clear liquor treated with hydrosulphuric acid gas, to remove the excess of lead. It was then concentrated by evaporation, and boiled with washed animal charcoal, prepared by digesting the charcoal in hydrochloric acid, and washing with water. The light coloured solution thus obtained was evaporated to an extract; by which the acetic acid resulting from the decomposition of the subacetate of lead was expelled. This extract was digested in alcohol of specific gravity .815, until it ceased to afford any bitterness; the alcoholic solution, when evaporated, gave a highly coloured product. This was again dissolved in water, boiled with washed animal charcoal, filtered and evaporated, when there resulted a peculiar reddish-brown uncrySTALLIZABLE substance, slightly deliquescent by exposure to a moist atmosphere.

Another portion of bark was boiled with water and quick lime, strained, and the solution treated with sulphate of zinc until no further precipitate was produced. It was then filtered and evaporated to an extract; this was treated with alcohol of specific gravity .815, until no further bitterness could be obtained, and the alcoholic solution evaporated. It was redissolved in water, boiled with washed animal charcoal, filtered and evaporated, which afforded a product similar to the preceding.

This substance is characterized by its exceeding bitter taste and peculiar smell, somewhat similar to the animalized odour of the bark. It is very soluble in alcohol and in water, but insoluble in ether. It is not affected, when in solution, by sulphate of iron, tartrate of antimony and potassa, sulphate of copper, acetate and subacetate of lead, bichloride of mercury, or by the infusion of gall-nuts. It does not neutralize the acids.

The concentrated nitric and hydrochloric acids dissolve it, forming red coloured solutions, in which the bitterness still remains. Concentrated sulphuric acid dissolves it, and at the same time the solution changes to a very dark violet colour. This solution, when diluted with water, turns to a red, and a matter insoluble in alcohol or water is deposited. Dilute sulphuric acid dissolves it without change. The similarity of this substance to salicine is, in many particulars, sufficiently striking to admit of its being classed with that article, as possessing at least a like nature, if not an identity of composition.

First. They are both procured by similar processes.

Secondly. They are insoluble in ether, but very soluble in alcohol or water.

Thirdly. Solutions of the acetates of lead, sulphate of alumina and potassa, tartrate of antimony and potassa, or infusion of galls, do not precipitate either of these substances.

Fourthly. They are similarly affected by the action of the mineral acids.

Fifthly. Salicine does not exist in a crystallizable state even in all the different species of willow. M. Peschier, of

Geneva, says that the *Salix hastata* and *Salix præcox* yield it uncrystallizable.

In continuing the analysis, the bark previously treated with water, was digested in alcohol. This solution was evaporated, which afforded an acrid resinous matter. This was distilled with a small portion of water, by which a small quantity of yellowish coloured oil was obtained, possessing the aromatic odour of the bark, and of a sharp, biting taste. Its specific gravity is greater than that of water. By the action of nitric acid, it is changed to a very bright crimson colour, the oil being at the same time decomposed.

The matter that remained in the retort after the distillation of the oil had the properties of resin. The portion of bark left after the above treatment was then digested in dilute hydrochloric acid. An excess of ammonia was added to the acidulous solution, which occasioned a white flocculent precipitate. This, on being separated and examined, proved to be magnesia. The remaining solution was then treated with a solution of oxalic acid, which produced a precipitate having the properties of oxalate of lime. The magnesia was obtained in small proportion to the lime, the latter being in comparatively large quantity. The remainder of the subject of analysis appeared to be lignin, or woody fibre. The usual reagents for fecula, tannin and gallic acid, gave no indication of their being constituents.

From the foregoing experiments, it appears that this bark is composed of gum, bitter principle, resin, volatile oil, colouring matter, lignin, magnesia and lime. The gummy matter differs, however, from pure gum, in being precipitated from its solution in water, by infusion of galls, and by most of the metallic salts, but not by alcohol except in very small quantity. The tonic properties of the bark reside without doubt in the bitter principle, and its diaphoretic and diuretic effects in the volatile oil. The resin, from its insipidity, is probably inert.

ART. XXXVIII.—*Remarks on the Vegetable Cathartics of the United States.* By JOHN C. ALLEN.

I OBSERVED with pleasure, in a late number of the Journal, an article on the vegetable emetics of the United States, and believing that any notice which may tend to attract the attention of the profession towards our indigenous productions, may be productive of advantage, I have been induced to offer a few remarks on the native and naturalized cathartic plants found in the United States, in hopes that others possessing better means of research will pursue the subject, and rescue it from the state of uncertainty in which it now remains.

In considering this class of remedies, the plants furnishing them will be spoken of according to classification of the natural orders, as given by Professor Lindley.

We do not find any native plant, said to possess cathartic properties, until we arrive at the third order, or the *RANUNCULACEÆ*, most of which, in a fresh state, are remarkable for their acridity, causticity and poisonous qualities. These properties, however, are generally lost by the process of drying, or in watery infusion.

The only indigenous plant in this order known to possess cathartic powers, is the *Helleborus fœtidus*; the root of which is stated by Allioni and others to be powerfully cathartic, emetic and anthelmintic; it is, in fact, the most active and energetic plant of the genus. Schœpf says that it is found in Virginia, and although not used in the United States, it is much employed in domestic practice in Great Britain; from its violent, and even poisonous qualities, it is always a dangerous medicine, and requires great caution in its administration.

The next order, *PAPAVERACEÆ*, contains the *Sanguinaria Canadensis*. The emetic properties have been fully described in a former number of this Journal. Both Schœpf and Barton speak of its cathartic powers, but it is seldom administered as a purgative, not only on account of its uncertain action on the bowels, but also from the violence of its prior effects on the stomach.

The eighth order, *PODOPHYLLÆ*, contains the *Podophyllum peltatum*, the root of which is generally acknowledged as one of the best of our native articles of the cathartic class. Dr. W. P. C. Barton asserts, from actual experiments, that it is fully equal to the common jalap of the shops, and the authors of the United States Dispensatory say, "It is an active and certain cathartic, producing copious discharges, without much griping or other unpleasant effect." The dose is from 15 to 30 grains.

There are no decided cathartic properties ascribed to any of our indigenous species belonging to any of the succeeding orders, until we arrive at the seventy-fifth, or the *AMYGDALÆ*, and even the purgative power of any of the plants composing it are very problematical. The leaves and petals of the peach, *Amygdalus Persica* are, however, stated to act on the bowels in large doses, and the fruit, like all others of a saccharine character, possess slightly laxative qualities.

The seventy-seventh order, or the *LEGUMINOSÆ*, is not only one of the most extensive but also most useful of the vegetable kingdom. It presents several plants, among those which are native or naturalized in the United States, which are entitled to notice for their medical properties.

At the head of the list is indisputably the *Cassia Marylandica*, which, from the testimony in its favour, appears to form an excellent substitute for the Alexandrian senna; it, however, requires to be given in rather large doses. When intended for medical purposes, the leaves should not be collected until late in the summer, or about the time of the ripening of the seeds, as earlier in the season they are comparatively inactive.

The *Baptisia tinctoria*, according to Dr. W. P. C. Barton, is both emetic and cathartic in large doses, and this statement is confirmed by Thatcher; it is, however, very uncertain in its effects when administered internally, and its principal and important use, is as application in decoction or poultice to gangrenous ulcers.

The *Colutea arborescens*, which is extensively cultivated in gardens as an ornamental shrub, also forms a good substitute

for senna, and is said to be used for the purpose of adulterating this drug.

The eighty-seventh order, or JUGLANDEÆ, affords but one species possessing purgative qualities. This is the *Juglans cinerea*, an extract of the inner bark of which is a mild and efficacious cathartic in doses of from 10 to 30 grains. In its action on the bowels it somewhat resembles rhubarb, but leaves them in a more open state.

The eighty-eighth order, the EUPHORBIACEÆ, contains many plants possessed of decided cathartic powers. Most of the species of *Euphorbia* are medicinal, being endowed with purgative and emetic qualities, though they all have the disadvantage of being very uncertain in their effects. The most efficient and safest of our native species, with regard to purgative powers, is the *E. corollata*, but even this is very apt to create much gastric distress. The *E. lathyris*, which has become almost naturalized, also presents some claims to attention. The oil expressed from the seeds acts very similarly to the oil of *tiglii*, requiring, however, to be given in larger doses, and not being as certain in its effects.

The most important plant of this order, in a medical point of view, is indisputably the *Ricinus communis*, which although not a native, has become naturalized by cultivation. The oil procured from the seed of this plant is perhaps the best of the mild purgatives, and is used more universally than any other article of its class; it is too well known to render it necessary to remark further on its properties or virtues.

Order ninety-sixth, or RHAMNEÆ, possesses but one native species that requires notice, the *Rhamnus catharticus*, the berries of which are an active purgative, but are seldom used on account of their nauseous taste, and unpleasant action on the stomach and bowels.

The one hundred and twenty-ninth order, POLYGALEÆ, contains many medicinal plants, but the only one that possesses any purgative qualities is the *Polygala senega*, the root of which is extensively used as an expectorant and diuretic; in large doses it is also emetic and cathartic; the latter effect, however, is seldom obtained without emesis also taking place,

a circumstance that precludes its use as a purgative, in most cases.

The great order of VIOLACÆ and the beautiful PASSIFLOREÆ, as well as the curious SARRACENIÆ, and many other of the succeeding orders, are not known to contain any native plants whose purgative powers are worthy of notice.

In the one hundred and fifty-fourth order, PHYTOLACCEÆ, the *Phytolacca decandra* is the only plant possessing cathartic properties. In this species, however, they are of a high order, although it is difficult to administer it, without also producing emesis. Some caution is necessary in its use, as it is liable, when given in large doses, to produce convulsions and unpleasant narcotic symptoms.

The one hundred and ninety-first order, CAPRIFOLIACEÆ, comprises a number of plants, which, whilst they form the delight of the florist, are also of great interest to the physician. The root and inner bark of the *Sambucus Canadensis*, are said to be drastic purgatives. This is also the case with the leaves, especially in a young state; they are always unsafe, from their uncertainty of action, sometimes operating so violently as to produce great distress.

The root of the *Triosteum perfoliatum* is a mild cathartic in doses of 20 or 30 grains, but in larger quantities is apt to affect the stomach.

In the one hundred and ninety-fifth order, or the ASCLEPIADEÆ, almost all the species are possessed of acrid and stimulating qualities, though few of them act on the bowels; some of our native species, however, are slightly purgative, in addition to their other powers.

The one hundred and ninety-seventh order, GENTIANÆ, although generally characterized by the tonic properties of the species composing it, contains a native plant that has attained some celebrity in domestic practice as a cathartic. This is the *Frasera Walteri*, the root of which, in a fresh state, acts in a prompt manner on the bowels, and is often substituted for rhubarb. When dried, it loses its purgative powers, but forms a valuable tonic bitter.

The one hundred and ninety-eighth order, SPIGELIACEÆ is

more remarkable for its vermifuge than its purgative qualities, though when administered in large doses, the *Spigelia Marilandica* will act on the bowels; it is generally necessary to combine some more efficient article with it to ensure that effect.

The two hundred and eleventh order, SCROPHULARINEÆ, includes many acrid and suspicious plants which act on the bowels. The *Gratiola aurea* possesses all the properties of the *G. officinalis* of Europe, but is seldom used; in small doses it is an active and a safe purgative; but in large ones it is apt to excite nausea and vomiting.

From the foregoing remarks, it may be perceived that but few of our indigenous vegetables can be depended on as cathartics; a few among them, however, are deserving the attention of the physician, and in case of need, may be substituted for the more expensive foreign drugs. Thus the roots of the *Podophyllum peltatum*, form a good succedaneum for jalap; the extract of the bark of the *Juglans cinerea* for rhubarb, whilst the leaves of the *Cassia Marilandica* are identical in their effects with the imported senna.

ART. XXXVIII.—*Some remarks on the Nomenclature of the celebrated Berzelius, with some suggestions respecting its amendment.* By R. HARE, M. D., Professor of Chemistry in the University of Pennsylvania.

ALL the binary combinations of oxygen have been called oxides, when not acid. Hence two names have been given to the compounds of that almost universal principle, actually distinguishing those which are electro-negative, from such as are electro-positive, without any view to this difference. The combinations of the electro-negative principles, chlorine, fluorine, bromine, iodine, cyanogen and its compounds, have by the French chemists been designated by the terminating monosyllable "*ure*," which by the English is translated into "*uret*;" but is not by them applied to the bodies in question

called by some of their distinguished chemists, supporters of combustion. The term *uret*, is by them restricted to compounds formed by the class of combustibles, comprised within which are carbon, sulphur, selenium, phosphorus, boron, silicon and the metals.

The chemists last mentioned use the termination *ide* to designate the combinations of the electro-negative class above mentioned, which are not acid, and hence designate as chlorides, bromides, fluorides, iodides, cyanides, compounds which the French call chlorures, fluorures, bromures, iodures, cyanures.

Berzelius, who, in referring to voltaic habitudes as a basis of nomenclature and classification, has gone further than any other writer, recommends the application of both terminations to designate the compounds formed both by the substances heretofore called supporters, and those called combustibles; the terminations in *ide* being used for the electro-negative compounds, the term in *ure* for those which are electro-positive. Sometimes, indeed, it would seem, if I understand him, that these terms are applied even where there is no corresponding electro-negative property, provided the number of atoms of the constituents correspond with those producing acidity or alkalinity, in compounds created by the union of oxygen with the same radical. Against this part of his plan, I beg leave, with the greatest deference for his transcendent ability, to object. I conceive it inexpedient that names for compounds formed of the same constituents, should vary with supposed atomic proportions, and obscure hypothetical relations.

As agreeably to the prevailing nomenclature, which in this respect is adopted by the great Swedish chemist, the electro-positive combinations of oxygen have all a termination in *ide*, it appears to me inconsistent to use this termination to designate electro-negative compounds. If the compounds of oxygen with radicals to form electro-positive bases, are called oxides, why should we not designate as sulphides, selenides and tellurides, the electro-positive compounds of sulphur, selenium and tellurium, formed with the same radicals? And since the last three mentioned bodies, when united with hy-

drogen, form electro-negative compounds, which act as acids, why not treat them as acids under appellations corresponding with those heretofore used to designate acids, other than oxacids? Thus we should have sulfhydric acid, telluhydric acid, selenhydric acid; also sulfhydrates, selenhydrates and telluhydrates. The words last mentioned are those actually used in the new Swedish nomenclature. By analogy, a student would expect the electro-negative ingredient of a sulfhydrate to be sulfhydric acid; not a sulphide of which the terminating monosyllable can, by its associations, only convey an erroneous impression.

Acids have been latterly divided, by some distinguished chemists, into hydracids, or acids produced by the union of hydrogen with a radical, and oxacids or acids produced in like manner by oxygen. The hydracids are subdivided by Berzelius, into two classes, one containing such as are created by a union of hydrogen with the class called by him halogene, comprising chlorine, fluorine, bromine, iodine, cyanogen and sulphocyanogen, and the other containing those which are formed with the four bodies which he classes under the name of amphigene, comprising oxygen, sulphur, selenium and tellurium. The halogene hydracids are decomposed by oxibases; the oxygen of the latter forming water with their hydrogen, and salts by the union of the radical of the acid with that of the base. The salts formed in this way, called by him haloid salts, are all binary compounds while dry, but on being moistened contain all the elements of a hydracid and an oxibase; and may of course be considered effectively as the same, as if the hydracid and the base had united without decomposition. The introduction of the word hydracid, as antithetical to that of oxacid, in a nomenclature founded on electrical habits, must tend to convey an erroneous impression, that hydrogen, in the one class, plays the same part as oxygen in the other. In reality, the former is the radical, the latter the electro-negative principle. Accordingly I find that Dr. Thompson does not recognize any class of acids under the appellation of hydracids; but with greater propriety places them under names indicating their electro-negative principles; as

for instance, he arranges them under the appellations severally of chlorine acids, fluorine acids, iodine acids, cyanogen acids &c. These words might advantageously, as I think, be abbreviated so as to read, cloracids, fluacids, iodacids, bromacids. To these I would add sulfacids, selenacids, telluracids.

It had been preferable, as I think, if the monosyllable designating the electro-negative compound, had been prefixed in all, as it has been in some cases. "*Hydrofluoric*" does not harmonize either with "*fluosilicic*," "*fluochromic*," or with "*fluomolybdic*," &c. &c. Fluorine being the electro-negative principle in each compound, the monosyllable indicative of its presence in them should in each occupy the same station. The same remarks will apply to the case of the other acidifying principles, with the exception of oxygen, which in obedience to long usage, is supposed to be present when no designating syllable is added.

Hence we should employ the words chlorohydric, fluohydric, borohydric, iodohydric, cyanohydric, in lieu of hydrochloric, hydrofluoric, hydrobromic, hydriodic, hydrocyanic. As, by the English chemists, the objectionable words have not yet been generally adopted, it may not be too late to introduce such as are consistent with each other.

Sulphuretted hydrogen, I would call sulphhydric acid, and in like manner the acids formed by selenium and tellurium with hydrogen, I would call selenhydric and telluhydric acids.

Berzelius alleges that the hydrofluoric acid has great tendency to enter into combination with other acids more feeble than itself, and that there are a multitude of remarkable combinations formed by it with metallic acids; yet he proceeds to observe that the latter are by their reaction with it, decomposed into corresponding fluorides, which combine with neutral fluorurets, to produce a great number of double salts. Agreeably to his new nomenclature, fluoruret (fluorure in the French translation,) is used to designate the electro-positive combinations of fluorine, while fluoride is employed to designate those which are deemed electro-negative. I shall question the existence of any characteristic in these compounds which can more justify their being described as double salts,

than the combinations arising from the union of oxacids and oxibases. Agreeably to the same authority, the reaction of a hydracid with a base is not considered as producing a combination of the one with the other, because the metal decomposes the acid by exchanging places with the hydrogen. Of course when a metal in like manner takes the place of the hydrogen in hydrofluoric acid, it ought not to be treated as if this acid entered into a combination. The learned author alleges that when fluoboric acid is received in water, at a certain period of the process, boric acid is deposited, and accumulates till the amount is sufficient to hold one-fourth as much boron as remains in the liquid in union with fluorine. The oxygen in the precipitated acid, is derived from a portion of water, of which the hydrogen is simultaneously united with the fluorine, liberated from the boron of the acid, forming thus hydrofluoric acid. This unites with the fluoboric acid, constituting thus a hydracid, with a double radical of fluorine and boron. I have already stated my objections to the idea that hydrogen should be treated as an acidifying principle when in union with substances more electro-negative than itself. I would consider the compounds of fluorine, both with boron, and with hydrogen, as acids formed by the same acidifying principle with different radicals, hydrogen and boron. Without supposing an anomalous affinity between two acids, we may explain the union of the hydrofluoric and fluoboric acids, by their common affinity for water. This view of the case appears to me to be supported by the fact, that when the proportion of water is diminished by its evaporation or a further impregnation with the gas, a decomposition ensues. Also the hydrogen of the hydrofluoric acid, restoring to the boron of the boric acid the place which it had usurped, reunites with the oxygen of the acid, and regenerates water.

There is much analogy between the phenomena, arising from the impregnation of water with the fluosilicic acid, and those which have been described as taking place in the case of fluoboric acid. By a decomposition of water, hydrofluoric acid and silicic acid are produced, by the union of silicon

with oxygen, and fluorine with hydrogen. The silicic acid, from its insolubility, precipitates, and the hydrofluoric acid and fluosilicic acid remain in solution, and, apparently, in combination. By exposure to a gentle evaporation, the silicon of the silicic acid, reunites with the fluorine of the hydrofluoric acids, while the hydrogen and oxygen again form water. Berzelius informs us that the most striking property of the hydrofluoric acid is the power of producing with the salts of potash, soda and lithia, gelatinous precipitates, which are at first hardly perceptible in the liquid, but which become manifest at the expiration of a few seconds: also that of yielding with barytic salts after a like interval, a white crystalline precipitate. By alkaline bases, in excess, this acid is wholly converted into a fluoride of the metallic radical of the alkali employed, and silicic acid; but when there is no more of the alkali presented than is necessary to saturate the hydrofluoric acid, this alone is decomposed, and the fluosilicic acid unites with the fluoride thus produced, generating a fluosilicate of the fluorides of potassium, sodium, or lithium. The resulting compound, containing no oxygen, in union with the metal of the alkali employed, is not to be confounded with such as contain that metal in the state of an alkali, and of course in that of an oxide. For instance, in the case of potash being used, a fluosilicate of the fluoride of potassium results, not a fluosilicate of potash. For the sake of brevity it would be better, I think, to say, fluosilicate of potassium. The hydrofluosilicic acid when diluted, may, to a certain degree, be concentrated by evaporation; but beyond this, fluosilicic acid gas is disengaged, and the hydrofluoric acid becomes more and more predominant in the residual liquid. "*There is no anhydrous compound of hydrofluoric and silicic acid,*" says Berzelius. "*They cannot exist together in a state of high concentration; as water is abstracted by evaporation, they separate.*" From this, I infer that they owe their union solely to their affinity for water, and that the liquid called hydrofluosilicic acid, does not deserve to be considered as a chemical combination of two acids, and still less an appellation which may lead the learner to consider it as a distinct acid. Ber-

zelius discards nitrous acid, consisting of four atoms of oxygen, and one of nitrogen, from the station assigned it by other chemists, among the class of distinct acids; because it can neither directly nor indirectly form salts, by uniting with salifiable bases. On being presented to the latter, it is always decomposed into nitric acid, and either nitric oxide, or what he calls nitrous acid, or the hyponitrous acid of other chemists.

Tried by these rules, how can hydrofluosilicic acid be recognized as a distinct acid, when agreeably to the statements of the same distinguished writer, like nitrous acid, it never enters into combination with bases, but when presented to them gives rise, by its decomposition, to other compounds?

On reading, in the admirable elementary work of the author above mentioned, his account of the double salts formed by the various substances, by him designated as halogenous, it struck me forcibly that there was a great analogy between them and the salts formed by oxygen and by other substances, called by him amphigenous, in which the electro-negative principle is an essential ingredient, both in the acid and in the base.

Agreeably to this suggestion, we should consider the chlorides of gold, platinum, palladium and of other metals which unite with chlorides ("chlorures") of other radicals, as acids. By analogy with oxides, the electro-positive compounds should be called chlorides, and the electro-negative principles should have names of acids analogical with those not containing oxygen, to which are prefixed distinguishing monosyllables, as for instance, chloroauric, chloroplatinic and chloropalladic, and the double salts, formed by these with alkaline and other chlorides, should be called chloroaurates, chloropalladiates.

Where the acid compound should contain two atoms of the acidifier to one of the radical, the term *bi* might be prefixed; and in like manner, the word *tri*, might be added, when there should be three atoms. Thus we should have bichloroaurate, trichloroaurate, and if necessary, quadrichloroaurate; perhaps it would be better to drop the monosyllable *ro*, substituting chloauric, chloaurate for chloroauric and chloroaurate.

Having spontaneously adopted these impressions, I was much pleased to find that they had been sanctioned, to a great

extent, by Dr. Thompson in his *Inorganic Chemistry*, the double chlorides being all represented by names corresponding with the suggestion above made. "I have no doubt," says this learned author, "that the number of chlorine acids will much increase as soon as chemists turn their attention to the subject. But few attempts have been made to determine whether those chlorides which contain acidifiable bases, be capable of combining with, and neutralizing those chlorides which contain alkalifiable bases." And again he observes, "It is evident from many chemical phenomena, that the chlorides of potassium and sodium are alkaline bodies, capable of combining with, and neutralizing various acid chlorides, as for example, the chlorides of gold and platinum." To these remarks I beg leave to subjoin, that if few attempts have been made with a view to determine whether the compounds of chlorine, and other bodies of the same class, are competent to produce acids and bases capable of forming salts, like those of the oxacids and oxibases, it is the more in favour of that mode of considering the subject, that so many neutral compounds, analogous to the latter, should have been produced. I regard every double salt, which is a definite compound of either chlorine, fluorine, bromine, iodine, or cyanogen, as an instance in point.

Berzelius considers the salt heretofore called ferropotassiate of potash, or ferrohydrocyanate of potash, as a double cyanure of iron and potassium, liable when dissolved in water, like other haloid salts, to be considered as an hydracid, united with an oxibase. Consistently with the views which I have presented above, it would be a cyanoferrate of the cyanide of potassium, or in other words, a compound of an acid consisting of cyanogen and iron, united with a base consisting of cyanogen and potassium.

Having ventured to offer the preceding suggestions respecting the nomenclature of Berzelius, I avail myself of this opportunity to recommend to the attention of my countrymen, his admirable *Treatise on Chemistry*, in eight volumes. Of these, I owe the possession of six, to the kindness of the author, and a seventh has since reached me by another channel.

To the six volumes I have devoted much time, and conceive myself fully rewarded by the additional knowledge derived from them. A vast number of topics are treated, more or less, in a new way, and with great ability. His work is as a fine picture, which every where displays the hand of a great master. It is especially in practical chemistry, that Berzelius stands preëminent. Sweden may, with good reason, be proud of her three great chemists, Scheele, Bergman and Berzelius.

F

SELECTED ARTICLES.

WE publish the following directions for the collection and preservation of plants for herbaria, hoping that it may prove as useful to others as we, from experience, have found it.

EDITOR.

ART. XL.—*Instructions for the Gathering and Preservation of Plants for Herbaria.* By CHARLES W. SHORT, M.D.

You ask me for instructions as to the best mode of preserving and arranging plants in your collection. This, although purely a mechanical part of the study of botany, is a very important one, since it is manifest that no one individual, at any season of the year, however favourably situated, can immediately refer to a large number of living plants at once; much less can he have them growing before him, at all seasons of the year. This difficulty is then most conveniently remedied by forming a collection of dried specimens, which, if well selected and preserved, and conveniently arranged, offers to our study and examination, at any moment, all the plants of a whole district, or even of the world. To this may be added, as the testimony of a very competent witness, and indeed, as the result of universal experience, that "no one can be a botanist without collecting plants, and making up a herbarium with his own hands." The utility of such a collection, however, in a great degree depends upon the care and labour bestowed in forming it; and as I know of no full and specific directions to this object to which I can refer you, in any of the common systems of botany, I am the more willing to communicate to you the result of my own very considerable experience in this business. I know from my own case, and

that of many others, that beginners in this study are apt to lose the fruits of several first years' labour, from a want of that kind of definite and precise instruction so necessary on the subject. You will therefore be fortunate, and I shall be well rewarded, if your first essays in this line should be so well executed as to be worthy of future preservation.

The manual labour of a botanist in forming his collections, may be arranged under three heads, as there are three several stages in the process: these are,

I. The collection of plants in their living state.

II. The drying of them for preservation.

III. The arrangement of the dried specimens in some suitable manner for convenient reference.

I. Before commencing your herborizing excursions, you must provide yourself with a tincase, technically called a *vasculum*; a small trowel, or a strong knife. The *vasculum* is very similar to a common tin candle-box; it should not be less than eighteen inches long and six inches in diameter, having a narrow lid opening on the top nearly its whole length, and secured by a hasp or catch. If this box is somewhat flattened on two sides, so as to assume rather an oval than a perfectly circular form, it will be more conveniently carried under the arm; and for this purpose it should be provided with two loops for a strap, by which it is suspended from the shoulder.

The peculiar excellence of this apparatus is, that plants shut up in it are effectually protected from evaporation, or injury of any kind; for collections made in the morning are taken out at night in a state of perfect freshness; and they will even continue so for several days. The protecting influence of this case is still the greater if it be not painted or japanned; as the sun, being more effectually reflected from the bright surface of the tin, will be less injurious to the plants contained within it. Some prefer taking with them on these excursions an oiled bag of silk; and some a large book of bibulous paper; but the tin *vasculum* is decidedly preferable to either. The use of the trowel, or the knife, is that of taking up small plants by the roots, or cutting larger ones into convenient lengths.

Thus equipped you start upon an herborization: and here the young botanist is apt to commit his first error; for, supposing that the common and unsightly productions of his neighbourhood,—those which he has been accustomed to consider as mere *weeds*,—are of no interest whatever, he passes over all such, in search of those which are more rare, more imposing in appearance, or more beautiful in flower. This is a radical error which you must avoid, and it should be your aim to collect every thing growing in your reach, and especially all such as are natives of the country; for when you come to exchanging specimens with distant botanists you will find that they take more interest in your common weeds, than in some others which you deemed more worthy of preservation. Collect then every thing which you meet with.

Another difficulty to the beginner arises from the great diversity in the sizes and habits of the plants, from the diminutive moss to the giant oak. As a general rule in this matter, the smaller are to be collected whole; the larger ones must, of necessity, be divided. As the length of your box has been directed in reference to the size of the paper in which your specimens are to be preserved and arranged, all plants which you can get into it without doubling or bending, should be gathered entire, even with their roots; those too large for this may be cut into two, or even three pieces of the proper length; which, in general, is preferable to bending or doubling them. Of those which are still larger it will usually be sufficient to gather a specimen from the summit, or part bearing the flower, together with a few leaves growing on different parts of the stem, and those of the root; for often the leaves on different parts of the same plant, are different in shape, or modes of attachment to the stem, from each other, and these differences should always be shown in the specimens preserved. Of trees, and the most of shrubs, you must, of necessity, content yourself by gathering the smaller twigs alone, selecting such, however, as bear the most perfect leaves and flowers.

As a general rule all plants should be gathered when their flowers are most perfectly developed; and it is always desira-

ble when the flowers appear before the leaves are unfolded, as in the most of our forest trees, that specimens be gathered, both when in flower and in full grown leaf: and moreover, when the fruit is of a kind which can be preserved in the manner presently described, that specimens of the fruit should accompany those of the flower and leaf. Some flowers are so exceedingly fugacious as to shed their petals within a few hours after unfolding, as the common *Sanguinaria*, *Jeffersonia*, and *Hydrastis*; these and some others, although they be put into your vasculum with full blown blossoms, will probably be found on taking them out, to have dropped them. This is best remedied by gathering specimens of such individuals as are not quite fully expanded, and if they should not have opened by the time you are prepared to preserve them, a few hours standing in a vase of water will bring them to the proper point.

Some very extensive tribes of vegetables are so very similar in their flowers, and other parts upon which distinctions are usually founded, that it is only by referring to their fruit, or ripe seeds, that they can be satisfactorily determined. Such are the large family of *Umbelliferous* plants, and the extensive grass-like genus *Carex*, not to mention some other tribes with which you will hereafter become better acquainted. These, therefore, should be gathered when their seeds are fully grown, but before they become so ripe as to shatter off too easily. Yet even of these I would advise that specimens be gathered also in the flower, for then their leaves are generally most perfect. In selecting specimens of all plants for preservation, you should take such as are fair samples of the most common height, habit and appearance of the species; rejecting stunted dwarfs on the one hand, or luxuriant monsters on the other: at the same time if any peculiar circumstance is found to characterise particular individuals of the species, constituting what are called *varieties*, specimens indicating these variations should be collected.

II. The drying of them for preservation. This is done by subjecting them to pressure between folds of dry paper. For this purpose you must be provided with two or three reams

of unsized printing paper, and some sort of machinery for making considerable pressure. This object is well effected by a press, in miniature, made after the fashion of the common tobacco or cotton press, and may consist either of a stout lever eight or ten feet long, playing in a fixed mortice and bearing upon a firm stand; or a wooden screw of two or three inches diameter, and as many feet in length, fixed in an appropriate frame-work. Some content themselves merely with the pressure exerted by large stones, or other heavy weights, placed upon their plants; but the lever press is altogether the most convenient, and by it a much greater amount of force may be exerted than by either of the other plans. It is well to be provided, moreover, with several loose boards of different thicknesses, but of uniform size with the paper employed: and the best size for the paper is that called by printers *medium*, which should be of a good, thick and substantial body. Divide one of your reams into parcels of four or five sheets, and prevent these sheets from becoming detached by passing a few stiches through them. These parcels, thus being eight or ten double, are called *dryers*; and they may be more economically made, and answer the purpose equally well if made of old newspapers, or other kind of waste paper, provided it be smooth and bibulous. If such are used they should be trimmed to the medium size, and stiched together by means of a thread running around the entire margin. The number of these dryers required will of course be in proportion to the number of plants which you undertake to preserve. In the extensive collections which I have made during the past season, I have not found less than one hundred sufficient; but when once prepared they will answer for several seasons' constant use. Unsized paper is preferred, because it absorbs moisture from the plants, much more readily than that which has been sized.

With these fixtures you are prepared for the task before you, which consists in placing your plants in single sheets of paper, putting these sheets between alternate dryers, and subjecting the whole to pressure. This is the nicest part of the entire process, and as upon the mode in which it is done, the

value and usefulness of your collection will depend, particular instructions will be given on this head. Take then any one plant from the vasculum and lay it between the leaves of a single sheet of your paper, taking care to spread it out so as to have its parts as little confused as possible. In doing this, however, you must give to its parts no unnatural direction; for, instance, do not give to a flower which naturally droops an erect position: flower stalks which are attached to but one side, must not be turned to both: a crooked or a tortuous stem must be left so, and a strait one must not be bent: in short avoid all unnatural stiffness, formality, or artificial arrangement of its several parts, and preserve as nearly as possible the natural habit of the plant while growing—for as it is now dried it must for ever afterwards remain. This sheet, with the plant or plants so arranged in it, is then placed on one of the dryers, and another dryer laid on it. Of the smaller plants a number may be placed in one sheet; of the larger, several sheets may be required by the different parts of the same plant; but care must be particularly taken in arranging them, that the different plants thus placed in the same sheet do not overlap or overlay each other, lest under pressure they should adhere together and otherwise interfere with the drying. Of such plants as have their stems very thickly set with leaves, some of these may be removed, so as to preserve and exhibit the remainder more perfectly. Where a number of stems arise from one point, and thus interfere with the equable pressure of the specimen, some from the under and upper sides may be removed. Where the stems are thick, crooked and unyielding, the knife should be employed in removing projecting points and in thinning them; and in very large and succulent stems, as those of the *Frasera* or *Sonchus*, it is sometimes necessary to split them in two, and to press the halves with their attached leaves, flowers &c., separately. Some flowers are so crowded on their branches as to require that some be stript off for the better exhibition of the rest, as in *Vernonia*, and some of the *Eupatoriums*; and some flowers are so bulky, hard and unyielding as to render it necessary to divide and press them separately, as in some species of *He-*

lianthus, *Rudbeckia*, *Cnicus*, *Silphum* &c.; a part of one of these large compound flowers, well pressed shows its character better than the whole badly preserved. It is a matter, moreover, of much consequence that the specimens be so flattened by pressure, as that they will occupy as little room as possible, and lie smoothly together in your Herbarium. Any obstacles, therefore, to this equable pressure of all its parts must be removed, when it can be done without interfering with the characteristic habit of the plant.

In this manner you proceed, arranging your plants in single sheets, and placing these between your dryers, until you have exhausted your vasculum, and formed a considerable pile. They are now ready for the press. Place the pile under your lever, screw, or weights; lay a thick board over it, of the proper size, and begin the pressure, making it at first moderate, so that the plants may gradually yield to its influence, without suffering violence or injury to their texture. In two or three hours the pressure may be increased, but not yet to the full amount of your power. After remaining in this situation for three or four hours longer, you will find on examining them, that all the papers, both single sheets and thick dryers, have become quite wet with the moisture absorbed from the plants; and they should now be changed. This is done simply by shifting the single sheets, without opening them or disturbing the plants, into fresh dryers, and immediately placing them under the press again, which should now be made to bear somewhat more heavily on them. Your moist dryers are then to be spread out in the open air, and in a hot sunshine, (upon boards, or on a flat roof preferably,) until they are thoroughly dried. In this way you continue transferring your sheets with their contents from moist to fresh dryers, at first twice, and afterwards once a day, increasing the pressure at each renewal, until all moisture is extracted from them, and they are rendered flat, thin and perfectly dry.

The time required for this process will vary according to the nature and peculiarities of the plants acted on. As a general rule, and for the most of plants, three days will be sufficient; yet some, as most of the grasses, are sufficiently dried

in two days; others, more succulent, and tenacious of life, as the *Sedums* and *Talinum*, require as many weeks. These latter, and some analogous plants, even make efforts to grow for some days after being subjected to the influence of a powerful press; others in drying cast off their leaves, as the fir tribe, the *Diospyros* &c., and some shed their flowers, as the *AGAVE Virginica*. To destroy this vegetating principle, and to dry such plants more speedily, and without a loss of their parts, it is advised to dip them in boiling water, and wipe them, before they are placed in the sheet. Some botanists prefer with such plants the yet more expeditious process of pressing them between folds of paper, under a hot smoothing iron, or a flat stone heated; the more expeditiously, indeed, all plants are dried the better do they retain their original colours; yet it is improper to subject them whilst drying to the influence of a hot sun, since they become thereby crisped and brittle. Notwithstanding, however, the utmost care, some plants cannot be made to retain their natural colours, but become black in drying; this is especially the case with the *Drosera*, *Buchnera*, *Gerardia*, *Podalyria* &c., and many others assume this hue, if allowed to remain too long in damp papers.

In pressing, at the same time, a great variety of plants, it is always well to examine them once a day, and to remove from the parcel such as are sufficiently dried; continuing to act upon the remainder until all are finished. It is, however, by no means necessary that one parcel should be entirely disposed of before another is commenced with. On the contrary, you may have under press at the same time, plants in every stage of the drying process, only taking care that thin boards are interposed between the different parcels to prevent the moisture of a fresh collection from affecting those which are dryer.

III. Still using the same thick medium printing paper, of good quality, trim the edges of it, so as to have every sheet of the same size, that they may lie more neatly together, and be more conveniently handled, than with the rough edges as they come from the mill. Into these new sheets, you next

transfer your specimens, from those in which they have been dried; and in my opinion it is decidedly better to leave them loose, than to have them attached in any manner to the sheet, because you can examine them much more conveniently; you may at any time substitute a better specimen for a more indifferent one; you can more effectually protect them from the injury of insects; and save the time and trouble required for fixing them. It is only necessary, for your own Herbarium, that one good characteristic specimen of each species be put up in this manner; unless, in the cases before specified, where varieties obtain in the species; where they produce flowers and leaves at different times; or where it is necessary to preserve specimens in fruit; in these cases, of course, specimens must be preserved, showing the species in these different stages. Any duplicates which you may have pressed over and above these, may be left in their original sheets for purposes presently to be mentioned.

This is perhaps the most convenient time for a very important, and indeed an indispensably necessary step in the business—the *labelling* of your plants. For this purpose, as you proceed in shifting your specimens, take slips of writing paper of convenient size, and write upon them, first the systematic name of the individual species—then its synonyms, and next its common English name or names, if it have any. Where any doubt exists as to the genus or species of your plant this must be expressed by the mark of interrogation (?) following after the name. To these it is always proper to add, especially if the plant be rare or peculiar to your district, various other items in relation to its history—the situation in which it is found—the character of the soil it prefers—whether marshy or dry, sandy or argillaceous, mountainous or plain &c.; together with the usual height it attains—whether annual, biennial, or perennial—time of flowering, and maturing its fruit or seeds. This label should be laid in the sheet with the species to which it belongs; and a similar one should be left with any duplicates of the same which you may have on hand. If these particulars are not noted at the time, whilst they are fresh in your memory, you may forget them, and

afterwards have occasion to regret the want of such knowledge.

It must now be your care to protect this collection from two very noxious and destructive agents; *damp* and *insects*. For this purpose the case in which you keep them must be perfectly tight; and pieces of camphor, or bits of sponge moistened with some of the pungent aromatic oils, should be placed on each shelf among the volumes, and occasionally renewed. The more certainly still to prevent the depredations of insects, which will be found the more troublesome as you proceed southward, the collection should be looked over frequently in dry weather; and where their presence is detected they should be brushed away, and the affected specimen gently passed over with a camel-hair pencil dipped in a solution of corrosive sublimate in spirit. This not only protects it from farther injury in this way, but even brightens its colour.—*Transylvania Journal of Med.* No. 21.

ART. XLI.—*New Researches on Opium.* By S. PELLETIER.

Continued from page 158.

PART SECOND.

HAVING thus developed the course which I think should be pursued in the analysis of opium, I shall now proceed to examine in detail the immediate principles which this afforded me.

Narceine.—Pure narceine is always white and silky; when crystallized from alcohol it is in long slender needles; when crystallized from water, the crystals are more flattened; under the microscope they appear to be four-sided prisms. It has no smell, but possesses a slightly bitter taste, which is distinguished from that of morphine and narcotine, by being accompanied by a sensation analogous to that experienced from the galvanic action of zinc and silver. It requires 250 parts of boiling and 375 of cold water to dissolve it. Exposed to a high temperature, but not sufficient to decompose it, it melts; its point of fusion is about 197° F.; on cooling it

assumes the appearance of a translucent white mass; at 262° F., it becomes yellow, and on an increase of temperature it is decomposed without being sublimed. The fusibility of narceine is greater than that of morphine or narcotine. The concentrated mineral acids act on narceine very energetically, and completely change its character. These same acids, diluted with a certain proportion of water, so as not to react on the elements of narceine, combine with it, as with a salifiable base of the second order (not forming a neutral salt, but uniting in definite proportions;) but the combination of narceine with the diluted acids, as, for example, with fuming hydrochloric acid diluted with one third of water, presents some remarkable phenomena; at the moment the acid comes in contact with the narceine, this latter assumes a splendid blue colour; if a sufficient quantity of water be added to dissolve the combination, a perfectly colourless solution is the result; but sometimes before disappearing, the colour changes a purplish rose tint. This change does not always take place, especially when the water in which the blue crystals are dissolved is not acid; but by permitting the colourless solution to evaporate slowly, a purplish rose coloured crust is obtained, which finally becomes blue, if there is not an excess of acid, in which case a yellow crust forms, and the substance is altered in its properties. Desirous of ascertaining if these three tints were attributable to the water, which seemed to be the case, by the recurrence of the phenomena in an inverse order, on the evaporation of the water, I endeavoured to produce the blue in a colourless solution of hydrochlorate of narceine, by removing the water by a highly absorbent body; for this purpose I made use of salts or haloid bodies, having no acid or alkaline reaction. I placed a fragment of chloride of calcium, melted or completely dried, in a capsule, and moistened it with a colourless solution of hydrochlorate of narceine; as the chloride of calcium absorbed the water, its surface assumed the rose, purple and blue tints spoken of above. This experiment was repeated with other absorbent substances, with equal success.

Narceine dissolved in water with the aid of a weak acid,

although sufficiently concentrated to produce the blue colour of the greatest intensity, underwent no alteration. In fact, if a solution of an alkali, as potassa, soda or ammonia be added, it precipitates in white acicular crystals, resembling the narceine obtained by crystallization from its aqueous solution, preserving all its physical and chemical properties.

Having substituted magnesia in powder, for the alkaline solution, with the intention of decomposing a concentrated solution of hydrochlorate of narceine, I obtained a rose coloured pasty mass; this, in drying, became blue. Treated with weak hydrochloric acid, it dissolved without becoming coloured; with hydrochloric acid, diluted with a half part of water, it became blue; the magnesia had therefore acted on the hydrochlorate of narceine in a complex manner; the first portions had decomposed a part of the hydrochlorate of narceine, but the hydrochlorate of magnesia, in uniting with water, had transformed the undecomposed portion of the hydrochlorate of narceine into a salt, at the second degree of hydrotation; the mass having become solid, the decomposition was arrested. In substituting nitric and sulphuric acids for the hydrochloric, the same series of phenomena were obtained, except that it was requisite to dilute the nitric acid with two parts of water, and the sulphuric with four or five, to prevent the alteration or destruction of the narceine. Hydrofluosilicic acid produced the same effects.

I was not able to produce the blue colour with solutions of the vegetable acids, but by moistening crystals of oxalic, citric or tartaric acid with a solution of hydrochlorate of narceine, violet and blue zones were produced. Concentrated citric acid dissolved narceine without colouring it, but by adding chloride of calcium to the solution, the violet and blue tints appeared. We have stated that the concentrated mineral acids destroyed narceine; I observed this more particularly with the nitric. Concentrated cold nitric acid dissolved narceine, colouring it yellow, without any red tint, if no morphine was present. On heating this solution, nitrous vapours were disengaged, but not in any quantity; finally, the concentrated solutions afforded, on cooling, well characterized

crystals of oxalic acid; the mother liquor was sensibly bitter.

Metallic solutions presented no striking phenomena with narceine. The neutral or slightly acid salts of iron had no action on it, and indicated no trace of morphine, when it had been well purified. I satisfied myself that there was no relation between the blue colour produced by solutions of the salts of iron with morphine, and that produced by the acids with narceine; for ferruginous solutions, which had a marked action on morphine, produced no change in narceine; whilst the acids which coloured narceine blue, caused no such change with morphine. I said above, that on heating narceine to 197° F. it melted without alteration, and that at a temperature above 212° F. it became brown and was decomposed. If the heat be still further increased, it swells, and emits fumes which are at first whitish and afterwards yellowish, leaving much charcoal; in the receiver will be found an acid, slightly coloured liquid, and in the neck of the retort, a brown bituminous substance, of a balsamic odour; white acicular crystals are also observable, which I at first thought were carbonate of ammonia; but instead of being alkaline, these crystals were acid, reddening litmus paper, soluble in water and alcohol, and striking a blackish blue colour, with solutions of the persalts of iron. Are they gallic acid? I believe so, but the small quantity obtained did not permit me to decide positively.

<i>Ultimate analysis.</i>	Carbon	54.73	= to atoms	16
	Nitrogen	4.33		1
	Hydrogen	6.52		24
	Oxygen	34.42		8
		<hr/>		
		100.00		

Atomic weight, 2261.31.

Narcotine.—Berzelius regards narcotine as an organic salifiable base; I am of the same opinion, at the same time classing it among the alcaloids or organic bases of the second order. In fact, the combinations which narcotine forms with the acids are only permanent when the acids are powerful.

I was the first to prove, that the acetate of narcotine is decomposed by heat, and have indicated the use of acetic acid as a mode of separating narcotine from morphia. I regard narcotine as existing in opium in a free state, without the fatty matter that always accompanies it, may be considered as performing the part of an acid.

Except this be the case, all the facts detailed in the first part of this memoir, tend to show that narcotine exists in a free state in opium; and this is the opinion generally entertained in France, whilst in Germany a contrary doctrine is held. In fact, we read in a celebrated work, that if powdered opium, or the watery extract of this drug, be treated with sulphuric ether, the ether will dissolve the narcotic salts; that after the evaporation of the ether, among other products obtained, is a saline mass of a dirty brown, which reddens litmus paper, and contains a narcotic salt, the acid of which has not been discovered, that if this salt be dissolved in warm water or boiling alcohol, that the narcotine can be precipitated by ammonia.

I repeated these experiments with great care, and have found that the crystals which separate from the ethereal tincture, (crystals which may be obtained almost white, by washing them with a little very cold ether,) are insoluble in boiling water, and consist of narcotine, either pure or simply united to a little fatty matter. The ether from which they crystallized being entirely evaporated, there was a residue of caoutchouc, fatty matter, and crystals of narcotine, the whole impregnated with an aqueous fluid, which was slightly acid. This fluid was formed of water and acetic acid, holding narcotine in solution, narcotine which could be precipitated by ammonia, as is stated in the above cited work, but in quantity not exceeding a twentieth of that directly obtained by the evaporation of the ether; I am even of opinion, that the acetic acid arose from the decomposition of a small quantity of ether, for I have often remarked this formation of acetic acid in treating vegetable substances with sulphuric ether. Narcotine unites with all the strong mineral acids. However, I could not obtain any of these combinations in a crystalline form,

except the hydrochlorate of narcotine, already described by M. Robiquet.

M. Liebig, in his admirable researches on the elementary composition of vegetable alcalies, having found numbers for narcotine, a little different from those given by M. Dumas and myself, I have repeated the analysis with the greatest care. The narcotine used had been perfectly purified, it contained no trace of morphine, and was entirely freed from fatty matter, was well crystallized, and of a brilliant white. It gave

Carbon	65.16	= 17 atoms.	By calculation	65.17
Nitrogen	4.31	1		4.33
Hydrogen	5.45	17		5.31
Oxygen	25.08	5		25.07

This analysis presents very similar results to those obtained by M. Liebig, as regards the carbon and hydrogen, but I found more nitrogen; the analysis was several times repeated with the same results. Convinced of the care taken, and knowing the dexterity of Mr. Liebig, I must conclude that there was some difference in the narcotine analyzed by us; perhaps that used by Mr. Liebig contained some fatty matter.

Morphine.—This has been more studied than any other of the immediate principles of opium, nevertheless some points of its history still require elucidation. Thus, for example, the manner in which chlorine, iodine, bromine, and their compounds act on it are as yet but little known. However, I shall not go into this at present, although I have made some experiments on the subject, because I propose to make it the object of a special study, also comprising the action of the same agents on the other vegetable alcalies.

A characteristic property of morphine is that of striking a very beautiful blue colour with a salt of the peroxide of iron. This remarkable property was first noticed by Mr. S. Robiquet, but I know that neither he nor any other chemist has endeavoured to ascertain what occasioned this singular reaction. We are ignorant whether the blue colour is owing to a combination of morphine with the salts of iron without alteration, or if the morphine is altered and gives rise to a new

combination. To ascertain this I made the following experiments:—

I heated morphine with a solution of the hydrochlorate of the peroxide of iron, as neutral as possible, and highly concentrated; the morphine immediately became of a deep blue, which soon became lighter. In twenty-four hours the whole was a crystalline mamillary mass, of a dirty white colour, resembling hydrochlorate of morphine; on gradually adding water, the crystalline substance reassumed the blue colour, and was dissolved; it was promptly filtered, but not an atom of oxide of iron was separated; the liquid was then evaporated by a gentle heat; when sufficiently concentrated, and placed in a cool situation, it furnished crystals, which, when washed with a little cold water, or purified by solution and recrystallization, were found to be very pure hydrochlorate of morphine. This hydrochlorate, treated with chloride of iron, reproduced the same phenomena.

The blue liquor, when it afforded no more crystals, was subjected to several experiments; diluted with much water, it assumed a decided rose-red tint; exposed for some time to the air, it precipitated the peroxide of iron, and lost its colour. When it was prepared with water deprived of air, and kept in closed vessels, the colour was permanent, and no oxide of iron was precipitated. Before going further, we may remark, that, since there is a formation of a notable quantity of hydrochlorate of morphine, when morphine is placed in contact with a perfectly neutral solution of hydrochlorate of iron at a maximum, it must necessarily happen, that some of the hydrochloric acid is taken from the iron, but as no oxide of iron separates, this latter must remain in the fluid in the state of a new combination. We may also remark, that the iron cannot be in the state of a peroxide, as when the liquid is exposed to the air, and the iron passes into the state of a peroxide, it precipitates, and the fluid loses its colour. It would appear, then, that in the action which the morphine exercises on the hydrochlorate of the peroxide of iron, independently of the quantity which unites without alteration to the hydrochloric acid, that one portion, or some of its elements, unites with a

portion of the oxygen of the peroxide of iron, and forms an electro-negative body which combines with the oxide of iron; this combination might be called the morphite of iron. The blue liquid, which affords no more crystals of hydrochlorate of morphine, was evaporated to dryness, and left a deliquescent brownish mass, resembling tartrate of iron; this mass treated with alcohol was very slightly soluble, and a substance remained which was soluble in water, and gave it a violet tinge. The alcoholic tinctures on spontaneous evaporation, furnished a violet substance which was dissolved in sulphuric ether; the ether assumed a slight green colour. By the spontaneous evaporation of this menstruum, two distinct products were obtained; one not crystallized, this was chloride of iron; the other, in small quantity, was formed of small translucent, greenish crystals, which dissolved in water, and tinged it of a magnificent blue colour. It acquired scarcely an atom of this substance to produce this phenomenon in a considerable quantity of water. This concentration of the colouring property in this substance, and its power of crystallizing, led me to regard it as being the blue substance produced by the salts of iron with morphine, in the greatest state of purity in which it can be obtained. Finally, it appears, that in the reaction of morphine on the salts of the peroxide of iron, a portion of the morphine changes its nature by seizing part of the oxygen of the peroxide of iron, and forms with the oxide of iron, at an inferior degree of oxidation, a combination which becomes of a very intense blue on uniting with water.

Resin of Opium.—In calling the substance obtained from the marc of opium, soluble in alcohol and insoluble in ether, a resin, I had more reference to its properties, than to its elementary composition. I also avow, that I do not like to multiply the immediate principles of vegetables. Perhaps, some day, chemists will throw off the yoke, as has already been done by naturalists, and will establish a new species, or new genus, whenever observation has shown that a certain substance is possessed of essential characters which distinguish it from those among which it had hitherto been classed.

By whatever name the substance under consideration may be called, it is brown, inodorous, insipid, insoluble in water, soluble in all proportions in alcohol; softens by heat, and becomes almost liquid; heated over a naked fire, it swells, and affords much empyreumatic oil, and percarburetted hydrogen.

It readily dissolves in the alcalies, even in the cold; its solution in ammonia is permanent. In considering it as a resin, it would occupy a place among the highly electro-negative, according to the classification of Unverdorben, admitted by Berzelius. The solution of the resinous matter of opium in soda or potassa, takes place without a disengagement of ammonia, although it is an azoted body; but this is also the case with morphine.

It is owing to the presence of nitrogen, which I found in this body, in making its elementary analysis, that it should be separated from the resins, from the most of which it also differs by its insolubility in ether.

The results of its analysis are:—

Carbon	59.825	= atoms 16.	By calculation	59.51
Nitrogen	4.816	1.		4.30
Hydrogen	6.813	23.		6.98
Oxygen	28.546	6.		29.19

Oleaginous matter of Opium. This substance, which accompanies the narcotine obtained from the marc, and which can be separated from it, by the processes described in the first part, is generally yellow or brownish; I am, however, of opinion that the yellow or brown colour is foreign to it, and that in a state of purity, it would be white. I have even obtained it, two or three times almost colourless, by dissolving white narcotine, obtained from the marc by means of alcohol, and placed in contact with animal charcoal, in very diluted hydrochloric acid; in bleaching the narcotine, the fatty matter that accompanied it, was also whitened. This fatty or oleaginous matter, which is found in small quantities in opium, ought rather to be considered as a fatty acid analogous to the oleic, than as a neutral substance. In fact, notwithstanding reiterated washings, the fatty matter retains acid properties; its alcoholic solution reddens litmus paper,

and also affords another reason for considering it as a fatty acid, for it is well known that fatty bodies, which are not acid, are in general less soluble in alcohol than those which are acid. Finally, it unites almost instantaneously with potassa and soda, and forms true soaps. If these be decomposed by tartaric acid, the fatty matter is obtained in the same state as at first. Burned with deutoxide of copper it furnished no nitrogen. It is formed of—

Carbon	72.39	= atoms	6
Hydrogen	11.82		12
Oxygen	15.78		1

Caoutchouc of Opium. The name of caoutchouc, given to this substance by M. Robiquet, in my opinion ought to be retained; from comparative experiments which I have made, I have proved that the caoutchouc of commerce and that of opium, are too analogous in their properties, not to be considered as belonging to the same species; at most they are but varieties. I have remarked, that substances which dissolve the caoutchouc of commerce, as naphtha, the volatile oils, and some ethers, also dissolve the caoutchouc of opium; this latter is more readily dissolved than that of commerce; this arises, in all probability, from its less aggregated state. The mean of four analysis is as follows:—

Carbon	87.89	= atoms	3.	By calculation	88.025
Hydrogen	12.11		5.		11.177

These results differ exceedingly little from those obtained by Mr. Farady, in the analysis of common caoutchouc; this able chemist found that caoutchouc was formed of carbon 87.2, and hydrogen 12.8.

Other immediate principles of Opium. Leaving the account of meconine to M. Conerbe, it remains for me to speak of the meconic acid, the brown acid extractive matter, the bassorine, the gum and woody fibre; but these three last substances are of too little importance to require further notice; I shall also abstain from speaking of the meconic acid, as I have understood that M. Robiquet is engaged in investigating it. As to the brown acid, I must confess that I have not sufficiently studied it to present any thing definite.—*Journal de Pharm.*

ART. XLII.—*Apparatus and Processes.* By ROBERT HARE, M. D., Professor of Chemistry in the University of Pennsylvania.

1. *Improvement on Brunner's process for potassium.*

WHEN I first went through Brunner's process for potassium, as modified and described by Berzelius, I conceived the idea of substituting, for the piece of a gun barrel between the iron bottle and receiver, an iron cylinder much larger in bore, and using an iron vessel without naphtha, instead of that recommended by the great chemist last mentioned. From the employment of this, much inconvenience was experienced; as in consequence of reiterated explosions, every one present was more or less bespattered with naphtha. Subsequently I found that in both of my conceptions I had been anticipated by Dr. Gale of New York. Agreeably to my latter experiments, I find that the receiver may be dispensed with advantageously on every account. I have successfully employed a hollow iron cylinder of about two inches in bore, and fifteen inches in length; which is at one end fastened into the generating bottle by screwing, and at the other end receives a piece of a gun barrel to which a lead pipe is adapted, so as to be air tight. This pipe is recurved in such a manner, as to convey the gas and fumes into the ash hole of the furnace employed.

By means of a keg supplied with water, from which proceeds a lead pipe furnished with a cock, a stream of water is directed upon the iron cylinder sufficient to keep it cool. The water, as it runs off from the cylinder, is caught in a flat dish, from which it is conveyed by another lead pipe. Thus refrigerated, the cylinder retains nearly all the condensible potassium. The receiver, should not, however, be allowed at a minimum, to be below a boiling heat in the coldest part, as in that case aqueous matter is detained in it, and, I believe, re-oxidizes more or less of the potassium. Towards the close of the process, to prevent the condensible matter from obstructing the narrow part of the receiver next the bottle, it must be kept in a state of incandescence.

Operating with the proceeds of seven pounds of bitartrate

of potash, properly carbonized, I have obtained of the metal in question, seventeen hundred grains in pieces large enough to be conveniently lifted by forceps. But as in boring the metal out of the tube inflammation is liable to ensue, unless naphtha be applied, the potassium thus extricated is much imbued with this liquid, with which it always has a reaction productive of some loss. Besides, a considerable proportion of it, is always deposited in a state of mixture or combination, with a carbonaceous matter, from which it can be completely separated only by intense heat. Hence I deem it preferable, after removing the cylinder from the bottle, to close one end by screwing on an iron cap provided for that purpose, to adapt to the other a piece of a gun barrel duly recurved, and proceed to distillation. I have tried distillation *per descensum*, which has the advantage of allowing a portion of the metal to be extricated by simple fusion. The last portions, however, can only be obtained at a white heat. I must confess that I have not as yet been enabled to make up my mind as to the method which may be upon the whole preferable in this part of the process. From actual trials it appears that it is possible to receive the potassium, as it comes over by distillation, in a bottle, replete with hydrogen desiccated by chloride of calcium. I have constructed an apparatus, by which I expect this method of operating will be rendered more easy and effectual, but I have not as yet put it into operation.

Notwithstanding its unusually large calibre, the cylinder became repeatedly so clogged by the metal and the carbonaceous deposit, as to occasion some difficulty in keeping the passage clear; and likewise some loss of potassium, of which a considerable quantity always accompanied the rod used for the purpose when retracted. In order to remedy these evils, as a substitute for the iron cylinder above mentioned, I have had another equally long receiver forged, of which the bore at each orifice is two inches in diameter, but enlarges at a little distance from either end to two and a half inches. I hope that the cavity of this receiver will be adequate to receive all the condensable products without being obstructed.

I intend hereafter to furnish a more complete description of my process for potassium, illustrated by a cut.

I have made an improvement in the art of luting. It consists in using the shreds of iron which are shaved off in making weavers' reeds of that material. These shreds are entangled together like the fibres of wool, and constitute a mass which, by analogy, we have called iron wool. With these shreds, fire clay blended with as much sand as is consistent with the necessary plasticity is intimately intermingled and stamped into a flat cake of a size sufficient to envelope the bottle completely. Being applied to the bottle, it is afterwards secured by a wire wound about it in a spiral, of which the rounds are not more than a half inch asunder, and the ends are duly secured by twisting them together.

The effect of this intermixture of iron fibres is surprising. The lute hardens on exposure to the fire without previous desiccation.

I rolled up two equal balls, one consisting of fire clay alone, the other of the same clay intermingled with the iron wool. Both were thrown into an intensely heated part of an anthracite fire. The ball which consisted of clay alone, soon flew to pieces, while the other retained its shape, and hardened into a mass having the firmness of a brick.

The plan proposed by Dr. Gale of keeping potassium in glass without naphtha, is one which I have pursued since 1818. I have been accustomed to seal a tube at one end, then to heat it at a convenient distance from the end, and reduce the diameter by drawing it down to about a quarter of an inch. Into the tube thus prepared, hydrogen is made to enter, so as to exclude the air. The potassium being then introduced, and the open end of the tube closed by means of a spirit lamp, the metal may be fused, and with a little dexterity may be transferred in pure globules to that part of the cavity of the tube which is between the sealed end and the narrow part. This object being effected, the tube is divided at that part, and sealed by fusion.

In this case, the potassium usually falls upon the glass and

adheres to it, presenting a perfectly brilliant metallic coating, and preserves this appearance without diminution for years.

It is however liable to inflammation from slight causes when kept without naphtha. I had an ounce of it in a small phial for eighteen months which took fire on my venturing to divide the phial by means of a file.

An account of an explosive compound produced by the reaction of naphtha with potassium.

I avail myself of this opportunity of mentioning a circumstance which occurred in January, 1831, and which I should have mentioned before, had I not hoped to have had leisure to ascertain the cause of the phenomenon.

Having some globules of potassium of a size so small as to be separated with difficulty from the naphtha with which they had been intermingled; I endeavoured to get rid of the naphtha by heat. With this view I heated the whole mass in a sealed tube, properly recurved to act as a retort. The glass, when heated to the boiling point of the naphtha, became quite black, so as to lose its transparency. When all the naphtha had been expelled, I inverted the tube in another of a larger size filled with hydrogen, and otherwise prepared as above mentioned. A few globules of the metal ran into the tube thus prepared, and were secured there; so that, to this day, their brilliancy is unimpaired, and they still have in some points, a striking degree of brightness. They are accompanied by a few drops of a colourless naphtha which is still unchanged.

Being dissatisfied with the quantity of potassium thus procured, I proceeded to examine the caput mortuum left in the tube used as a retort. With this view, striking it with a hammer, I was startled by a violent detonation. From the circumstance that this result was the consequence of the reaction of potassium, naphtha, and flint-glass, it seems to be distinguished from the explosions which are well known to occur in the process above alluded to, by which potassium is obtained from carbonate of potash, according to Brunner.

I have already mentioned that in the first operation which I made after that plan, I used the copper vessels recommended

by Berzelius. The inner vessel having been allowed to remain in connexion with the gun barrel, which formed the means of communication between it and the iron bottle, for thirty-six hours after the process was terminated, my assistant attempting to effect a separation, struck the neck of the receiver with a hard body. Immediately a detonation ensued, as violent as if a musket had been fired, and the receiver, though open at one end, was bulged from a square nearly into a cylindrical form. In this case it might be imagined that naphtha had some agency, yet it could have had but little access to the part of the apparatus from which the explosion proceeded. Besides, Dr. Gale mentions that he met with explosions in removing potassium and its accompaniments from the interior of the tube, when no naphtha had been used, and he recommends the affusion of that liquid, as a preventive of explosion.

The rod employed to keep the passage through the iron cylinder free as above mentioned, coming out coated with potassium, I strove to detach it by scraping, and to save it by receiving it in naphtha. I succeeded in amassing in this way a quantity worthy of the trouble. In scraping the rod for this purpose by the edge of a square bar, explosions constantly took place as the latter came in contact with a bluish matter, the nature of which I could not ascertain. Berzelius ascribes these explosions to moisture; but they have occurred, as in the instance above mentioned of detaching the receiver, where moisture could not have contributed to the result.

Of a method of filling tubes with potassium.

I have succeeded in filling glass tubes with potassium in the following manner. One end of a tube is luted to one of the orifices of a cock; to the other orifice, the neck of a gum elastic bag of a suitable size is attached. The open end of the tube is reduced in diameter by means of a flame excited by the blowpipe, so as to have an orifice about large enough to receive a knitting needle. The gum elastic bag is filled with hydrogen, and the cock closed. Meanwhile the potas-

sium is heated in naphtha, in a larger tube, till it lies at the bottom in a liquid state.

In the next place, the bag is grasped with one hand, and subjected to pressure, at the same time introducing the small orifice of the tube into the naphtha, the cock is opened till the hydrogen begins to escape in bubbles. The escape of the bubbles is kept up to prevent the naphtha from entering the tube, and to evacuate the bag. Before this is quite accomplished, the orifice of the tube is to be approximated to the surface of the potassium as nearly as possible without entering it, and just as the last of the gas is expelled, is to be merged in the metal.

The cock is at the same time to be closed, and the pressure of the hand on the bag discontinued. The cock being in the next place very cautiously opened, the elasticity of the bag counteracts the pressure of the atmosphere within the tube; and the liquid potassium is forced to rise into it. This effect may be controlled by the cock, which is to be closed when the column of the metal has attained a satisfactory height. After being removed, cooled and separated from the cock, the tube may be closed by a covering of sheet gum elastic, such as is procured by the inflation of bags softened by ether. Any portion of the contents thus preserved may be extricated by cutting off and fracturing a portion of the tube, adequate to yield the requisite quantity.

In order to guard against accidents the apparatus was heated in this process by a bath of naphtha; in a bath of hot water. For the object last mentioned, the vessels ordinarily used for the solution of glue were employed, the naphtha being placed in the inner vessel usually occupied by the glue.

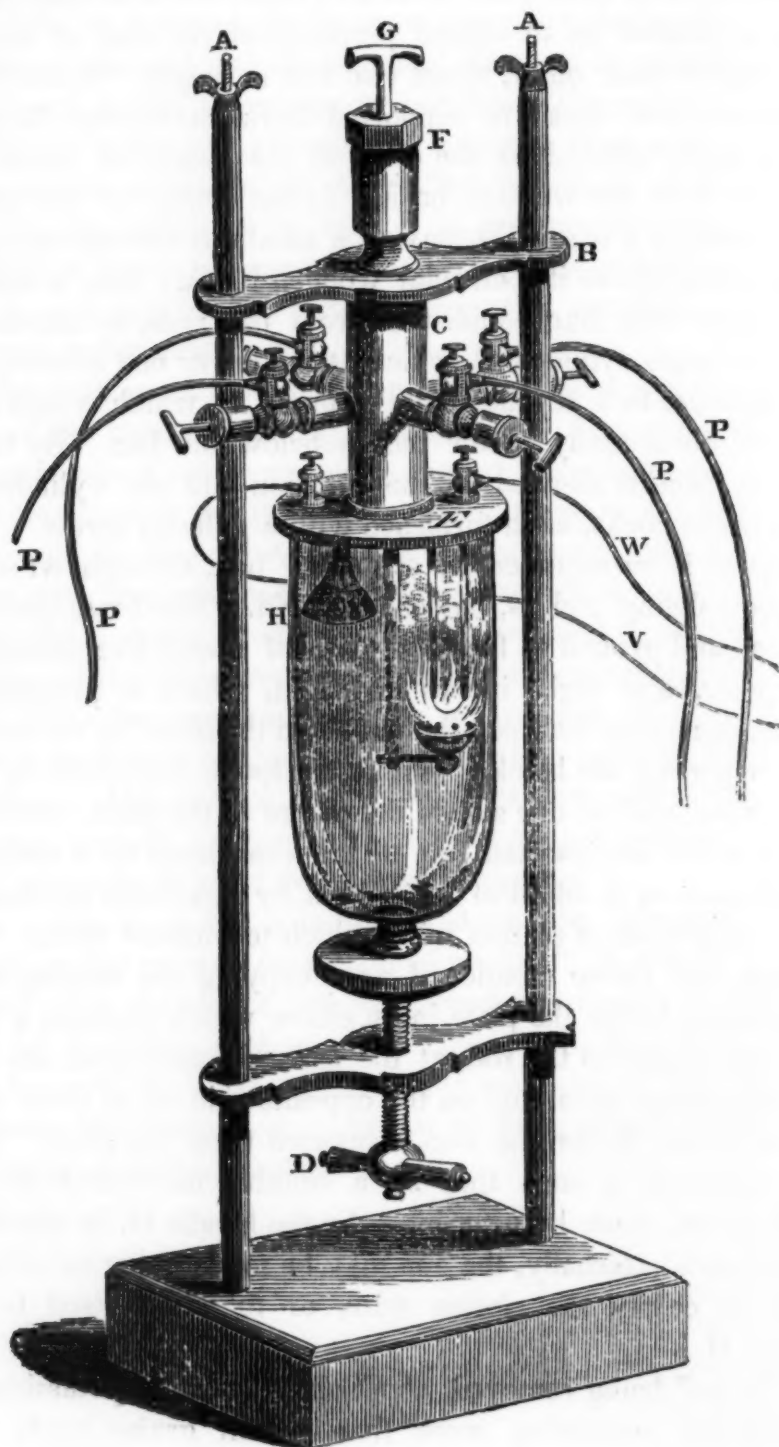
I have long been in the practice of filling tubes with phosphorus by a similar process.

2. Apparatus for evolving Silicon from Fluosilicic Acid Gas.

Into a stout mahogany block as a basis, two iron rods A, A, are so planted as to extend perpendicularly, and of course parallel to each other, about two feet in height. Upon these rods two iron bars are supported horizontally, one, B, near their upper extremities, the other at the height of about six inches from the wooden basis. In the centre of the lower bar, there is a screw, D, having a handle below the bar, and supporting above it a circular wooden block. Into a hole in the upper iron bar, equidistant from the rods, is inserted a hollow brass cylinder, C, which at the lower end screws into an aperture in a circular plate of brass, E, which is thus supported horizontally a few inches below the bar. By these means room is allowed for the insertion into the cylinder of four valve cocks, each furnished with a gallows screw. The cylinder is surmounted by a stuffing box, through which a copper sliding rod, G, passes air tight. The brass plate is turned and ground to fit a bell glass of about five inches in diameter, and eight inches in height, which is pressed up when necessary between the plate and the block by the screw D, supporting the block. Within the space comprised by the bell glass, and on one side of the centre of the plate, two stout brass wires are inserted, one of them insulated by a collet of leathers, so as to admit of the ignition, by a galvanic discharge, of a small arch of platina wire, which terminates them. The sliding rod above mentioned as occupying the stuffing box, terminates below the plate in an elbow which supports a cup at right angles to the rod, at the same distance from the rod as the platina wire, and on the opposite side of it, there is a brass cover, H, for the cup, supported from the plate. The arrangement is such that by a suitable movement in the sliding rod, made by grasping it by the handle G, in which it terminates externally, the cup may be made either to receive into its cavity the platina wire, or to adjust itself to its cover H.

The bell being removed, about sixty grains of potassium in pieces not containing more than fifteen grains each, are

APPARATUS FOR THE EVOLUTION OF SILICON FROM FLUOSILICIC ACID GAS, BY MEANS OF POTASSIUM AND A WIRE IGNITED BY A CALORIMOTOR.



to be introduced into the cup, which is then to be adjusted to the cover, and the bell secured. In the next place, by means of the flexible lead tubes, P, P, P, P, and the gallows screws attached to the valve cocks, establish a communication severally with an air pump, a self-regulating reservoir of hydrogen, a barometer gage, and a jar over the mercurial cistern containing fluosilicic acid gas. First, by means of the air pump exhaust the bell, and in order to wash out all remains of atmospheric air, admit hydrogen from the reservoir. Again exhaust, and again admit hydrogen. Lastly, exhaust the bell of hydrogen and admit the fluosilicic acid gas. By means of the gage, the exhaustion is indicated and measured, and by the same means it will be seen when the pressure of the gas within the bell, approaches that of the atmosphere. When this takes place, the cocks being all closed, by means of a calorimotor, the platina wire is to be ignited, and the potassium brought into contact with it.

A peculiar deep red combustion ensues, evolving copiously chocolate coloured fumes, which condensing into flocks of the same hue, subside throughout the receiver, (excepting the colour,) like snow in miniature. On removing the bell after the potassium is consumed, the cup which held it will be found to contain silicon mixed with the fluoride of potassium, and with this indeed the whole of the powder deposited is contaminated. Silicuret of potassium is likewise formed in the cup, since on the affusion of water, a fetid evolution of silicuretted hydrogen ensues. By repeated infusions, first in cold, and afterwards in boiling water, agreeably to the directions of Berzelius, the silicon is left in the state of a brownish ash coloured powder.

Thus obtained, silicon does not appear to be acted on either by sulphuric, nitric, fluoric, or muriatic acids; nor when exposed to nitrate of potash liquified by heat. It seems to be soluble for the most part in a mixture of nitric and fluoric acid, which by analogy we may call nitrofluoric acid; but after exposure for eighteen hours to this solvent, a small proportion of a black matter remained undissolved. This is, in all probability, carbon derived from the potassium, which, ac-

according to Berzelius, when obtained by Brunner's process, is liable to be combined with carbon. The solution of nitrofluoric acid, decanted from the residual black powder into a solution of pearlash, gave a copious, white, gelatinous precipitate like silex, which, when thrown into a large quantity of water, subsided undissolved. When on subjecting the silicon to red hot nitrate of potash, anhydrous carbonate of the same alcali was added, so as to coöperate with the nitre, an explosive effervescence took place. All the silicon disappeared, and a compound resembling the silicate of potash was produced. This anomalous reaction may be considered as characteristic of silicon.

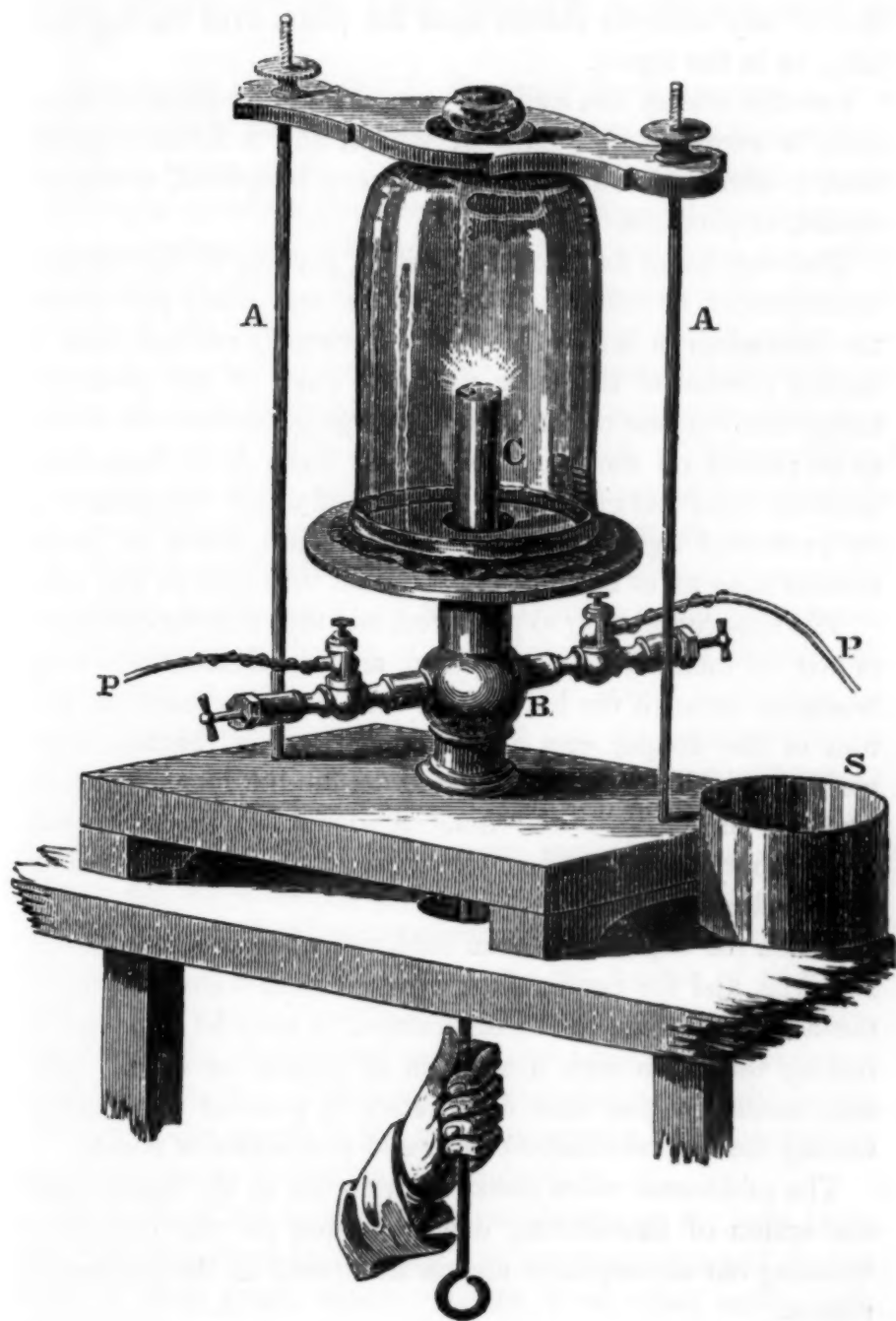
The impression that the black matter insoluble in the nitrofluoric acid, was carbon, is confirmed by the fact, that after the silicon had been digested for some hours in strong nitric acid, and finally boiled in it to dryness, it dissolved in nitrofluoric acid without any such residuum.

3. *Improved process for the evolution of Boron.*

By means of an apparatus represented by the annexed engraving, I have succeeded in evolving boron by the reaction of potassium with vitrified boracic acid, in vacuo, without encountering the evil of any explosive action, to which the process, as heretofore conducted, in pleno, has been found liable.

A circular brass plate, is prepared, like the plate of an air pump, so as to produce with any suitable receivers properly ground, an air tight juncture. It is supported on the upper end of a hollow brass cylinder, B, with the bore of which it has a corresponding aperture. The brass cylinder is about three inches in diameter, and six inches in height, being inserted at its lower end into a block of wood as a basis. This cylinder receives below, a screw, which supports a copper tube, C, of about two inches in diameter, so as to have its axis concentric with that of the cylinder, and to extend about four inches above the plate. The copper tube, thus supported, is closed at the upper termination by a cup of copper, of a shape nearly hemispherical, and soldered at the upper edge, to the edge of the tube; so that the whole of the cavity of the cup is within that of the tube. Hence the bottom of the cup is accessible to

APPARATUS FOR THE EVOLUTION OF BORON FROM BORACIC ACID,
BY MEANS OF POTASSIUM.



any body, not larger than the bore of the tube, without any communication arising between the cavity of the tube, and that of any receiver placed upon the plate, over the cup and tube, as in the figure.

Into the side of the cylinder supporting the plate, a valve cock is screwed, by means of which, and a flexible leaden tube, a communication with an air pump is opened, or discontinued, at pleasure.

The cup being first covered with a portion of the vitrified boracic acid, as anhydrous as possible, and finely pulverized, the potassium is introduced, and afterwards covered with a further portion of the same acid, two parts of the potassium being used for one of the acid. A large glass receiver is now to be placed on the plate, secured by rods, A, A, concentric with the tube and cup; from the heat of which the glass is to be protected by a bright cylinder of sheet brass, S, placed around it so as to be concentric with the receiver and tube.

The apparatus being so prepared, and the receiver exhausted of air by means of the air pump, an incandescent iron is introduced through the bore of the tube, so as to touch the bottom of the copper cup. In a short time a reaction commences, which aiding the influence of the hot iron renders the cup and its contents red hot. A deep red flame appears throughout the mass, after which the reaction lessens, and the heat declines.

When the cup has become cold, the air is admitted into the receiver, and the contents are washed with water. If any of the acid has escaped decomposition, it may be removed by boiling the mass with a solution of potash or soda. After this treatment and due desiccation a powder will remain, having the characteristic colour and properties of boron.

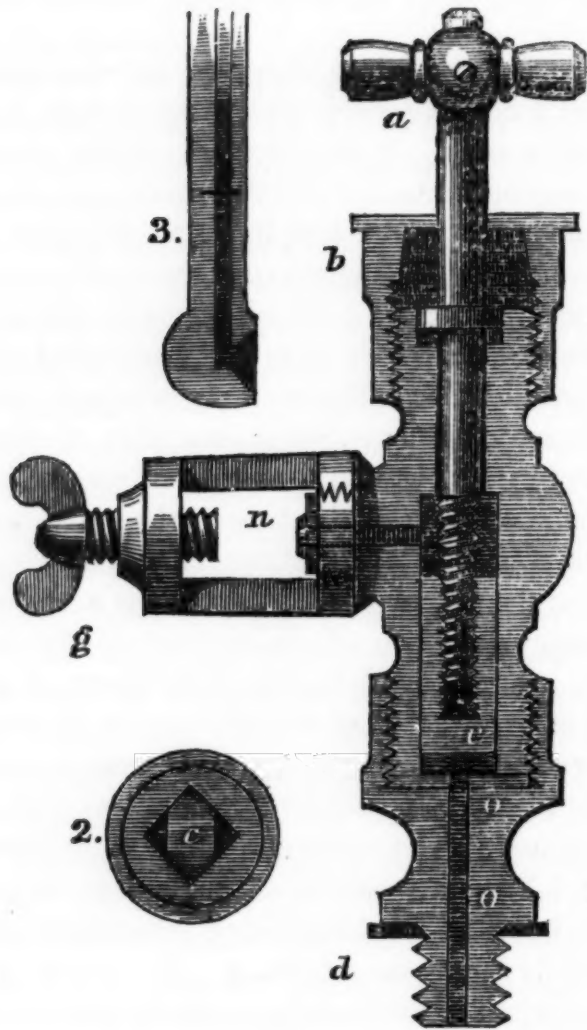
The additional valve cock, represented in the figure, gives the option of introducing dry hydrogen for the purpose of washing out atmospheric air, as described in the process for silicon.

4. *Description of the Valve Cock, a perfectly air tight substitute for the common Cock, alluded to in the preceding article.*

This figure is intended to illustrate the construction of a substitute for a common cock, which I have been accustomed to call a valve cock. It was devised by me about twenty years ago, among a number of other analogous contrivances, and seems upon the whole less liable to fail than any other which I have tried. The engraving represents a longitudinal section of the valve cock. At *a* is a piston with a collar enclosed in the stuffing box *b*, so as to be rendered air tight by means of oiled leather. Hence the piston may be turned or made to revolve on its axis, while incapable of other motion. Upon the end of the piston a thread for a screw is cut which fits into a female screw in the brass prism *c*, so as to cause this prism to approach to, or retreat from a bearing, covered by leather, in the centre of which there is a perforation *oo*, communicating with one of the orifices of the instrument. This orifice is surrounded by the male screw *d*, so that by means of this screw, the valve cock may be fastened into an appropriate aperture, properly fitted to receive it, subjecting an interposed leather to such pressure, as to create with it an air tight juncture. The prism *c*, has two of its four edges cut off (see fig. 2,) so as to allow a free passage by it, reaching to the lateral perforation terminating in another orifice, over which there is a gallows screw, *g*. By means of this gallows screw, when requisite, a brass knob, such as that represented by a fig. 3, soldered to a leaden pipe, may be fastened to the valve cock. The juncture is rendered air tight by the pressure of the screw in the gallows, upon a leather which is kept in its place, by means of the nipple *n*.

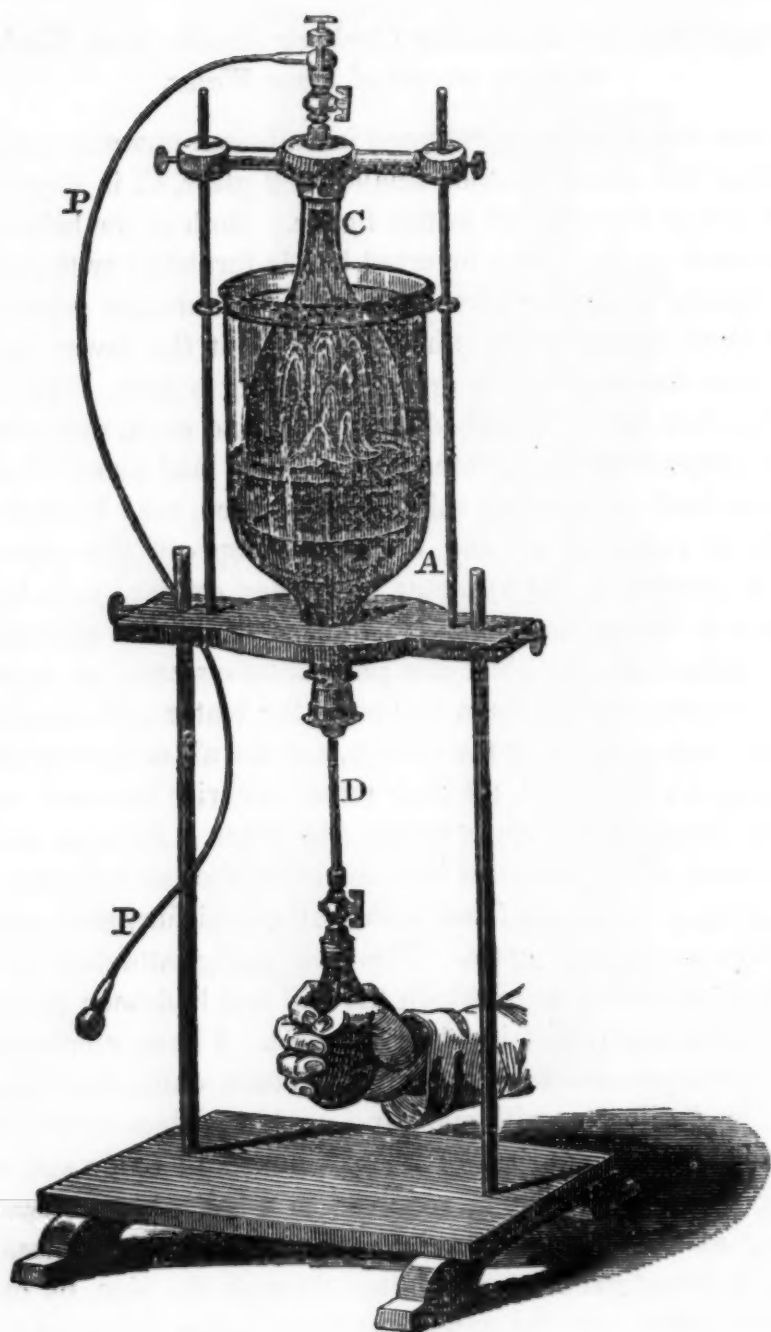
The method last mentioned, of producing an air tight juncture, was contrived by me about seven years ago, and proves to be of very great utility. There is no other mode with which I am acquainted, of making a perfectly air tight communication, between the cavities previously separate, at all comparable to this in facility.

THE VALVE COCK—A PERFECTLY AIR TIGHT SUBSTITUTE FOR
THE COMMON COCK.



5. *Apparatus for separating Carbonic Oxide from Carbonic Acid, by means of Lime Water.*

Lime water being introduced in sufficient quantity, into the inverted bell glass, another smaller bell glass, C, is supported within it as represented in this figure. Both of the bells have perforated necks. The inverted bell is furnished with a brass cap having a stuffing box attached to it, through which the tube D of copper slides air tight. About the lower end of this tube, the neck of the gum elastic bag is tied. The neck of the other bell is furnished with a cap and cock, surmounted by a gallows screw, by means of which a lead pipe PP, with a brass knob at the end suitably perforated, may be fastened to it, or removed at any moment. Suppose this pipe, by aid of another brass knob at the other extremity, to be attached to the perforated neck of a very tall bell glass filled with water upon the shelf of a pneumatic cistern: on opening a communication between the bells, the water will subside in the tall bell glass, over the cistern, and the air of the bell glass C being drawn into it, the lime water will rise into and occupy the whole of the space within the latter. As soon as this is effected, the cocks must be closed and the tall bell glass replaced by a small one filled with water, and furnished with a gallows screw and cock. This bell being attached to the knob of the lead pipe to which the tall bell had been fastened before, the apparatus is ready for use. I have employed it in the new process for obtaining carbonic oxide from oxalic acid, by distillation with sulphuric acid in a glass retort. The gaseous product consists of equal volumes of oxide and carbonic acid, which, being received in a bell glass communicating as above described by a pipe with the bell glass C, may be transferred into the latter through the pipe, by opening the cocks. As the gaseous mixture enters the bell C, the lime water subsides. As soon as a sufficient quantity of the gas has entered, the gaseous mixture may, by means of the gum elastic bag and the hand be subjected to repeated jets of lime water, and thus depurated of all the carbonic acid. By



raising the water in the outer bell A, the purified carbonic oxide may be propelled, through the cock and lead pipe, into any vessel to which it may be desirable to have it transferred.—*Amer. Jour. Science and Arts, July 1833.*

ART. XLIII.—*On the Apocynum androsæmifolium*. By WILLIAM ZOLLICKOFFER, M. D., late Lecturer on Botany, *Materia Medica and Toxicology* &c. &c.

THIS genus is characterized as follows:—*Folliculi 2, longi, lineares. Semina papposa. Corolla campanulata. Anthera mediocum stigmati cohærentes.*

Species *undrosæmifolium*—*Foliis ovatis, glabris, cymis terminalibus, lateralibusque; tubo corollæ calycem superante.* The root of this plant is perennial; “stem herbaceous, erect, two to three feet high. Leaves opposite, ovate or oval, lanceolate, mucronate, and somewhat glaucous underneath. Corolla monopetalous, five-cleft, white, tinged with red. Nectary, five oval glands surrounding the germ, purple, viscid. Anthers scarcely as long as the corolla.”

According to Walter and Michaux, this species of *Apocynum* is an indigenous plant, growing naturally from Canada to Virginia. In Maryland it is to be seen almost every where. Here it is recognized by the common and local appellations of silk-weed, milk-weed, snakes-milk, dogs-bane &c. It is very incorrectly supposed by the peasantry to possess noxious properties. It is a lactescent plant, emitting upon the slightest incision into its cortical part, a profuse milky exudation, which, when exposed to atmospheric action, assumes the consistence of caoutchouc, and burns with considerable vividness, with flame analogous to that which results from the combustion of alcohol.

Chemical composition.—Resin, caoutchouc and mucus, are the chemical constituents entering into the composition of the *androsæmifolium*.

Solubility.—Its active properties are soluble in water and alcohol. Macerated for seven days 3240 grains of the con-

tused bark in alcohol, from which I procured, after carefully passing it through bibulous paper, and evaporating it over a water bath, 178 grains of alcoholic extract, and 28 grains of watery extract. Inversely from the same quantity I obtained 160 of water, and 104 grains of alcoholic extract.

Incompatible substances. It should not be given in combination with opium, when emesis is intended to be produced by its administration, not only because it frustrates its emetic action, but in consequence of it so modifying its operation as to cause it to display its effects upon the surface. *Capsicum annuum* completely controuls its emetic operation. In three instances I have taken a sufficient quantity to excite vomiting, in combination with five grains of the powdered *Capsicum annuum*, but without the least effect whatever.

Vegeto-anatomical examination.—Twenty-five hundred and thirty-six grains of the recent root afforded upon a separation of the different parts entering into its structural organization, 1726 grains of cortex or bark, and 810 grains of ligneous or woody part. Its activity resides exclusively in the bark, which composes rather more than two-thirds of the root.

Medical virtues.—It is tonic, emetic and diaphoretic. In doses of from ten to twenty grains it is admirably calculated to improve the tone of the digestive apparatus, and through this medium produce a corresponding impression upon the general system. Forty grain doses excites emesis very promptly, without inducing scarcely any previous nausea. It is therefore a mild and effectual emetic, and deservedly entitled to a conspicuous place in our pharmacopœias and apothecary shops. It is diaphoretic when given in combination with opium, *only* in the dose of forty grains with one of opium; exhibited at intervals of three or four hours.—*American Journal of the Medical Sciences.*

MINUTES OF THE COLLEGE.

March 26, 1833.

THE Board of Trustees reported that they had conferred the degree of graduate in Pharmacy upon Samuel Simes, Thos. H. Powers, Thomas J. Husband, Jos. C. Turnpenny, Wm. P. Hansford, Watson J. Welding, Edward Hopper, and Samuel C. Brown.

The Committee of Publication made a report which was accepted.

A committee was appointed to take into consideration the subject of weights and measures, and the propriety of procuring for the College standard sets of the same, in accordance with the Pharmacopœia of the United States.

The following gentlemen were duly elected Officers, Trustees &c. for the ensuing year:—

President—Daniel B. Smith.

Vice Presidents—S. Jackson, M. D., Henry Troth.

Recording Secretary—Charles Ellis.

Corresponding Secretary—Elias Durand.

Treasurer—Edward B. Garrigues.

Trustees—Edward Needles, C. H. Dingee, H. S. Fullerton, jr., J. C. Allen, Edward Roberts, Dillwyn Parrish, Wm. Biddle.

Publication Committee—D. B. Smith, Jos. Scattergood, G. B. Wood, M. D., Charles Ellis, R. E. Griffith, M. D.

June 25, 1833.—The committee on weights and measures made a report, which was laid on the table.

Willdenow's *Species Plantarum*, 10 vols., *Families of Plants*, 2 vols. and *Amœnitates Academicæ*, 10 vols., were presented to the College by D. B. Smith, E. Garrigues, G. B. Wood, Chas. Ellis, Wm. Hodgson, jr., Chas. Dingee, E. Durand, J. Scattergood &c.

Sept. 24, 1833.—The following gentlemen were duly elected Trustees. C. E. Pleasants, Peter Lehman, G. B. Wood, M. D., Wm. Hodgson, jr., Jos. Scattergood, S. F. Troth, F. R. Smith, Jacob Bigonet.

MISCELLANY.

Supplementary Communication, respecting Nomenclature. By R. HARE, M. D., Professor of Chemistry in the University of Pennsylvania.

In order to render more intelligible that part of my communication respecting the nomenclature of Berzelius, which relates to the double salts discovered by that great man, I send you a translation of the passage to which I referred, subjoining some additional observations.

Page 194, vol. 2, in treating of the hydrofluosilicic acid, the learned author states that, "when employed in excess, almost all the salifiable bases decompose this acid entirely, separating silicic acid, and giving rise to metallic fluorures. But when, on the contrary, no more of a base is added than the quantity necessary to saturate* the hydrofluoric acid, combinations with all the bases are obtained, analogous to double salts, resulting from a metallic fluoruret, combined with a quantity of silicated fluoride, in which the fluorine is in quantity the double of that of the fluoruret. These salts are, for the most part soluble in water, and are perfectly analogous to those produced, under like circumstances, by hydrofluoboric acid."

The salts thus mentioned, are subsequently described under names not easily translated into English. In the case of potash we have a fluorure silico potassique, or fluorure borico potassique, in the French translation. These appellations rendered in English would, I presume, be silico potassic fluoride, or borico potassic fluoride.

According to the view which I take, a salt, thus formed, (from potash,) would be called a fluosilicate (or fluoborate) of the fluoride of potassium, or more briefly a fluosilicate (or fluoborate) of potassium. For this last mentioned abbreviation ample authority is furnished in the case of oxy-salts formed of the metals proper. We designate a sulphate of an oxide, as a sulphate of the metal; as in the instance of sulphate of iron, or sulphate of copper &c.

The case of potash being given as an exemplification, it must be evident that the same terms will describe the fluosalts formed with the metal of any other base, by substituting the name of the metal, for the word potassium.

* It does not saturate this acid, but undergoes with it a reciprocal decomposition.

Ergot.—M. Boettcher, at Mendelurtz, in the duchy of Altenbourgh, believing that the different energy of various specimens of ergot might depend on the circumstance of its being collected before or after the cutting of the parent crop, obtained a quantity gathered before and after the harvest. He sent the separate products to the minister of public instruction at Berlin, who remitted them to Dr. Kluge for clinical trial at the Maternité of that city. The substance was employed on fifteen females, all well formed, and with natural presentations. The following are his comparative results:—1st. The action of the ergot of rye collected before harvest is very energetic, while that collected after harvest is totally powerless. 2d. In many cases the remedy renders the forceps unnecessary, especially when the insufficiency of uterine force depends either on real atony, or on a spasmodic contraction of the neck of the uterus. 3d. The ergot gathered before harvest arrests uterine hæmorrhage. 4th. The dose is from thirty to sixty grains, administered in portions of ten grains every ten minutes.

London Lancet, and Amer. Journ. Med. Science.

Chemical Analysis of Ergot.—In 103 parts of Ergot, Mr. Wiggers, of Berlin, has found—

White oily matter,	35.0006
Solid fatty matter, crystallizable, and of peculiar nature,	1.0456
Cerine,	0.7578
Fungous matter,	46.0862
Ergotine,	1.2466
Vegetable ozmazome,	7.7645
Sugar,	1.5530
Gummy extract, with red colouring principle,	2.3250
Vegetable albumen,	1.4800
Acid phosphate of potash,	4.4221
Phosphate of lime, and traces of iron,	0.2822
Silica,	0.1394

102.1030

There are some remarkable points in the preceding analysis. In the first place, the presence of vegetable ozmazome identifies the ergot with the class of mushrooms in which this substance forms a considerable proportion. In this ozamome seems to reside the power which promotes parturition. The ergotine is insoluble in water, and seems, from the experiments of M. Wiggers, to be the principle in which the poisonous qualities of the ergot reside. On several animals it has operated as a powerful irritant poison, while the ozmazome produced no such effect.

Lancet, and ibid.

Anthelmintic Emulsion.—Turpentine is now regarded as the most certain of our medicines for the expulsion of intestinal worms: it has been exhibited under a great diversity of forms, with a view chiefly to the modification of its nauseousness, or the increase of its specific powers: as combined in the subjoined prescription, it acts with remarkable efficiency:—

R. Infusi Sennæ,	f. 3x.
Syrupi Rhamni,	f. 3j.
Confectionis Scammoniae,	℥ij.
Copaibæ,	℥xxx.
Olei Terebinthinæ Rectificati,	f. 3vi.

Rité misceantur ut fiat emulsio, quæ horâ matutinâ sumatur.

This is the dose for an *adult*, having no contra-indicative symptoms: the patient should take it in bed, about four or five o'clock in the morning, and afterwards endeavour to sleep.

Med. Chirurg. Rev. July, 1832, and ibid.

Aricine, Quinine, Cinchonine.—Aricine was obtained by Pelletier and Coriol from a variety of Peruvian bark. Pelletier infers from a comparison of his analysis of aricine, with the analysis of quinine and cinchonine by Liebig, that the three may be represented by three grades of oxidation of a peculiar base, composed of 20 carbon, 24 hydrogen, and 2 nitrogen. Cinchonine consisting of this base with 1 atom of oxygen, quinine of the same base, with 2 atoms of oxygen.

Ann. de Chim. et Phys. Oct. 1832, and ibid.

Phosphuretted Hydrogen.—Rose proves that the gas obtained by heating hypo-phosphorous, or phosphorous acid, and the hypo-phosphates, and which is spontaneously inflammable in the air, is a base. It ranks them with ammonia, as being a basic compound of hydrogen with a simple substance.

Ann. de Chim. et Phys. Sept. 1832, and ibid.

Sarsaparilla.—Dr. Martins states that, in Brazil, besides the *Smilax sarsaparilla*, *syphilitica* and *officinalis*, that the *glauca* is also used, also that the sarsaparilla of Vera Cruz and Tampico is the *S. sarsaparilla*; that of Honduras the *S. officinalis*; that of Para, the *S. syphilitica*. In other countries, in place of these species many others are used; thus in Malabar the *S. aspera* is employed; in other parts of India, the *Hermidermus indicus*, in some portions of South America, the *Ferriera sarsaparilla* and *stellata*; in Peru, the *Lapagena rosea* and *Luzuriaga radicans*; in Cochin China, the *Smilax perfoliata*.

Journal de Pharm.

To remove Ink Spots.—Mix one teaspoonful of burnt alum, two drachms of citric and the same quantity of oxalic acid, with half a pint of cold water; to be used by wetting a piece of muslin with it, and rubbing it on the spots.

Mirror.

True Asiatic Styrax.—Most pharmacologists refer the origin of liquid styrax to the *Liquidambar styraciflua* of North America. It was forgotten that it was formerly brought by the Arabs from eastern Asia, by way of Persia. Petiver states (*Philosophical Transactions*, No. 313,) that this odorous and pure styrax, which is employed as a perfume, under the name of *Cottu misa*, by the Turks and Arabs, is the product of the bark of a tree called *Rosa-mallos*, in the Cobros islands in the Red Sea, three days journey from the isthmus of Suz.

Rumphius (*Amboyna*, t. 2, p. 57. 60,) mentioned the tree under the name of *Lignum papuanum*, and stated that it had the foliage of an elm. It was first described in the Transactions of the Batavian Society, by Noronha, and dedicated to Governor Alting, under the name of *Altingia excelsa*. The fruit was figured by Goertner. Afterwards Koenig and Simps gave a figure of the *Rosa mala* in their annals of Botany. 1806. No. 5, p. 325. Persoon and Spengel also mention this tree under the name of *Altingia excelsa*, (*Liquidambar orientalis*. Aiton.)

There is now no doubt from the descriptions and figures published by Blume in his Flora of Java, that the Styrax of the east is the product of the *Liquidambar altingia*, and other allied species. The Malays call these trees by the name of *Dupa*. *Journ de Pharm.*

Muriate of morphine.—A very soluble salt, forming bunches of acicular crystals; it is best obtained by digesting excess of morphia in dilute muriatic acid, filtering the solution, and evaporating. It has a bitter taste, and is an excellent narcotic, affecting the head less than the other preparations, and scarcely possessing any exciting powers; the dose is about half a grain. Eight grains dissolved in an ounce of distilled water forms a good solution for general use. *Brande. Pharmacy, 3d ed.*

Battley's sedative solution and the black drop.—Two preparations of opium much in use; the former is less stimulant than opium, and in strength about equal to the officinal tincture; it is said to contain acetate of morphia, the resin and extractive being separated.

The black drop was originally made about 100 years ago, by Edward Runstall, of Bishop Auckland, in Durham. It has been stated by the late Dr. Armstrong and others, that it is prepared by slicing half a pound of opium, and boiling it, in conjunction with an ounce and a half of nutmeg, and half an ounce of saffron in four pounds of verjuice; then adding a quarter of a pound of honey, and two table-spoonfuls of yeast; this compound is allowed to ferment for six weeks in a warm place, after which it is decanted, filtered, and bottled, adding a little sugar to each bottle. Were this recipe correct, it is evident that the black drop would contain an acidulous acetate of morphia, which is the case, as the drop, when diluted with water, and tested by litmus, displays acid properties: it is affected by most of the usual tests of opium, and indicates the presence of

morphia by nitric acid and permuriate of iron. The nature of this preparation is, however, unknown. It is much more powerful as a narcotic than the officinal tincture, three drops of which are only equal to one drop of the black drop. *Ibid.*

Expeditious manner of dissolving Amber and Copal.—After numerous trials I have at length succeeded in making a saturated solution of amber and copal in spirits of wine and oil of turpentine, without the addition of any foreign substances. I have tried the methods described by Tingry, Varley &c., but with common turpentine they will not succeed. Tingry's requires no less a period than six months. The plan I pursue is as follows—take a piece of glass tube about four inches long, one-half inch in diameter, and one-tenth inch thick; close up one end then introduce a few small pieces of amber or copal, and fill the tube about half full of alcohol, specific gravity .790 (I have not tried a weaker spirit;) close now the upper end with the blow-pipe, and hold it, by means of a wire twisted round it, over a clear fire. The spirit will presently disappear, and the tube be filled with a dense vapour; it may then be removed from the fire, when the vapours will be seen to condense all at once into a colourless fluid, which will turn yellow as it cools. When copal is operated upon, it appears quite opaque when the tube is full of vapour, but recovers its transparency as it cools. When the tubes are opened there is no escape of elastic fluid, and if the solutions are poured on a plate of warm glass they will flow into beautiful transparent varnishes. The amber will, no doubt, form an excellent varnish for electrical purposes. When oil of turpentine is used, it appears to expand so as nearly to fill the tube; when poured out it was nearly colourless, and dried almost as fast as spirit varnish. I need scarcely add, that the hand should be protected by a glove, and the face with a plate of glass, or a board with a hole in the centre. To make varnish in the large way, a Papin's digester should be used, and the heat may be regulated by laying the amber, or copal, on the cover; when they melt, the heat may be judged high enough, as copal applied to the outside of the tube readily melted after it had been removed from the fire some time.

G. DAKIN.

Mechanics' Magazine.

Plant furnishing Gum Ammoniac.—We have already noticed that Mr. Don had discovered the plant furnishing the gum ammoniac, (*Journal Philad. Colleg. Pharm.*) Since then he has published a description of this plant in the *Philosophical Journal*, No. 49, as follows:—

Dorema.—Discus epigynus cyathiformis. Achenia compressa, marginata: costis tribus intermediis distinctis, filiformibus. Vallecule univittatæ. Commissura quadri-vittata. Herba persica, robusta, facie fere opopanax. Folia ampla, sub-bipinnata. Umbella prolifera, subracemosa. Umbellulæ globosæ, breviter pedunculatæ. Flores sessiles, lanugini submersi.

Prussic Acid a Poison for Vegetables.—The sensitive plant, when exposed to the vapour of prussic acid, instantly closes its leaves. The same plant, as well as other tender plants, such as the garden pea and kidney bean, when subjected to the influence of this acid, quickly wither and die, and laurel water has the same effect on them. It appears also that plants which naturally contain the acid, as the cherry, laurel and almond, are not less susceptible of its poisonous action than others. Seeds steeped in the acid lose their power of germination.

Gazette of Health.

Citrine Ointment.—M. Cedié is of opinion that in recently prepared citrine ointment the mercury is in the state of a proto-nitrate, whilst it exists in a metallic form, in that which has been made for a long time. He has established this by treating the ointment with cold sulphuric ether. In the first case, he obtained a white powder bearing all the properties of the proto-nitrate of mercury, and in the latter, a gray powder which was mercury in a state of great division. He admits that the deuto-nitrate of mercury, used in the preparation of citrine ointment, is first changed to proto-nitrate by the oxygenizing action of the grease, and that this action continuing, the salt is finally reduced to the metallic state. The second effect, according to M. Cedié, is accompanied by a disengagement of nitrous gas; he founds this belief on the destruction of the writing on a label placed in a vessel containing citrine ointment. He justly observes, that the action of recent and old ointment cannot be identical, and requests the attention of practitioners to this point.

Journ. de Pharmacie.

Vegetable Yellows.—It is a curious fact that animal and vegetable yellows are more permanent than any other colours. The yellow of the petals of flowers is the only colour which is not discharged by the fumes of sulphurous acid. If a lighted match be held under a flower of the heart's-ease, (*Viola tricolor*) for instance, the purple tints will disappear, but the yellow will remain unchanged.

Field. Naturalist's Mag.

Oil of Digitalis.—The powder of the dried leaves is to be introduced into a glass retort, to which a tubulated receiver is connected by means of an adopter; a second receiver, containing alcohol or ether, is attached to the first by a bent tube. Heat is to be applied to the retort, by means of a sand bath, which can be raised to a red heat if requisite. The first product of the distillation is an aqueous fluid of a light yellow colour and virose smell; as the heat increases, the oil begins to be formed, it is at first yellow, but gradually becomes darker. Towards the end of the process, a considerable quantity of carbonate of ammonia is formed, and collects in a cool part of the apparatus. During the whole course of the operation, a dense, pungent smoke, consisting of the oil in the form of va-

pour, is evolved, the greater portion of which is absorbed by the alcohol or ether in the receiver. This is of some moment, as the fumes, even when much diluted, and inhaled for but a short time, cause *vertigo*, *nausea*, and headach. The empyreumatic oil possesses the following characters; it is semi-solid at 60° F., and melts at about 120°; of a dark brown, by reflected, and of a reddish colour by transmitted light; of a pungent, biting, disagreeable taste; causing an increased secretion of saliva. Its odour is nauseous, resembling that of a tobacco pipe which has been long in use; when shaken with water, it imparts to it the peculiar taste and smell, and renders it turbid. When heated with dilute acids, a portion is dissolved, and a solution of a reddish brown colour, and of the characteristic odour and taste, results. Alkalies, when aided by heat, readily act upon it, throwing down a dirty white precipitate, which, on exposure to the air, becomes brown and resinous looking. In this state, it is soluble in acids and in alcohol, and is precipitated from its solutions in the former, on the addition of an alkali. Boiling alcohol and ether dissolve the oil with great facility, and form transparent solutions of deep brown colour; on cooling, a flocculent precipitate falls; when this is examined under the microscope, it is found to consist of two substances, one crystalline, the other globular. If the solutions be allowed to evaporate spontaneously, the crystals may be distinguished by the naked eye, and the globules are quite distinct; that portion which imparts the colour to the solutions, gradually thickens and becomes of the consistence of extract. Strong nitric acid converts the oil into a substance bearing some resemblance to artificial musk, both in appearance and odour. The watery fluid which comes over with the oil is strongly alkaline, and effervesces with acids, from the quantity of carbonate of ammonia contained in it. Its colour undergoes several curious changes; but I have not yet investigated this part of the subject.

When a solution, prepared by agitating the oil with dilute acetic acid slightly warmed, is neutralized with potass and distilled, an opaque white fluid passes over; it is extremely acrid, and when applied to the tongue causes a copious flow of saliva; it is alkaline, and when neutralized by acetic acid, and evaporated at a heat not exceeding 140° F., small acicular crystals, of an intensely acrid taste are formed.* When an alkali is added to a transparent solution of these crystals, a cloudiness is produced, and after standing for some time, a precipitate is found adhering to the glass; this is soluble in alcohol, ether, and the acids. When muriatic acid is added to the distilled liquid, the milkiness is immediately destroyed, and the solution becomes of a transparent red.

Morries, in Edinburgh Med. and Sur. Jour.

* On turning over the article "Distillation Sèche," in Berzelius' Chemistry, I found that Reichenbach had described similar substances as existing in empyreumatic vegetable oils; the crystals correspond to his *Paraffine*, the globules to *Eupion*, and the dark coloured matter to *Pyretine*.—Berzelius, *Traité de Chimie*, vi. 636.

Preparation of pure nitrate of silver; by M. Bradenburgh.—Dissolve in nitric acid the common alloy of silver and copper. Evaporate to dryness, and heat the salt in an iron spoon till it ceases to boil. Dissolve, then, a very small portion in water, and try it with ammonia to see if any copper remains. If there is, heat it again a few seconds, and make a new trial: as soon as the nitrate of copper is decomposed, pour it on an oiled plate, or dilute the mass in water, and filter it to separate the deutoxide of copper set free by the decomposition of the nitrate.

Amer. Journ. of Science and Arts.

Decomposition of the chloride of silver in the moist way.—Take a small zinc or cast iron pot; put the chloride into it, in pieces, and cover it about an inch with water. If the zinc or iron be perfectly clean, the decomposition goes on pretty rapidly of itself, but if not entirely clean and fresh, it may be slow, and in that case, a little muriatic or sulphuric acid must be added. This addition is, besides, necessary for washing the silver and having it pure. The operation is rapid and curious to observe. The reduction penetrates from the surface to the centre. The temperature rises, if the mass be considerable, and contributes to accelerate the operation. It may, if too weak, be aided by artificial heat.

The chloride of silver may be reduced also by heating it with a mixture of lime and charcoal in the following proportions:—

Chloride of silver,	100.
Dry quick lime,	19.8
Charcoal,	4.2

But to prevent loss the chloride must be in powder.

Ibid.

Action of ether on sulphate of indigo; by M. Cassola.—If one part of indigo be dissolved in four parts of sulphuric acid, and diluted with twenty parts of water and an equal quantity of sulphuric ether be added, the liquid becomes discoloured in about half an hour, if it is kept constantly at a temperature of 100° F. in a well stopped bottle. The blue colour cannot be restored by oxygen, or metallic oxides.

Kartsner, Arch. t. 16, p. 126, and ibid.

To test the purity of chromate of potash; by Z. Zuber.—Add to a solution of the chromate, a great excess of tartaric acid. The fluid acquires, in about ten minutes, a deep amethystine colour, and gives no precipitate, either by nitrate of barytes or nitrate of silver, when pure; but, however small the quantity of sulphate or muriate, it may contain, it is rendered turbid by the addition of barytic or silver salts.

Bul. de Mulh. No. 6, p. 58, and ibid.

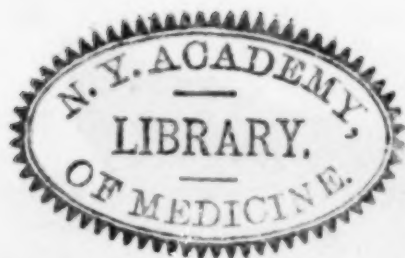
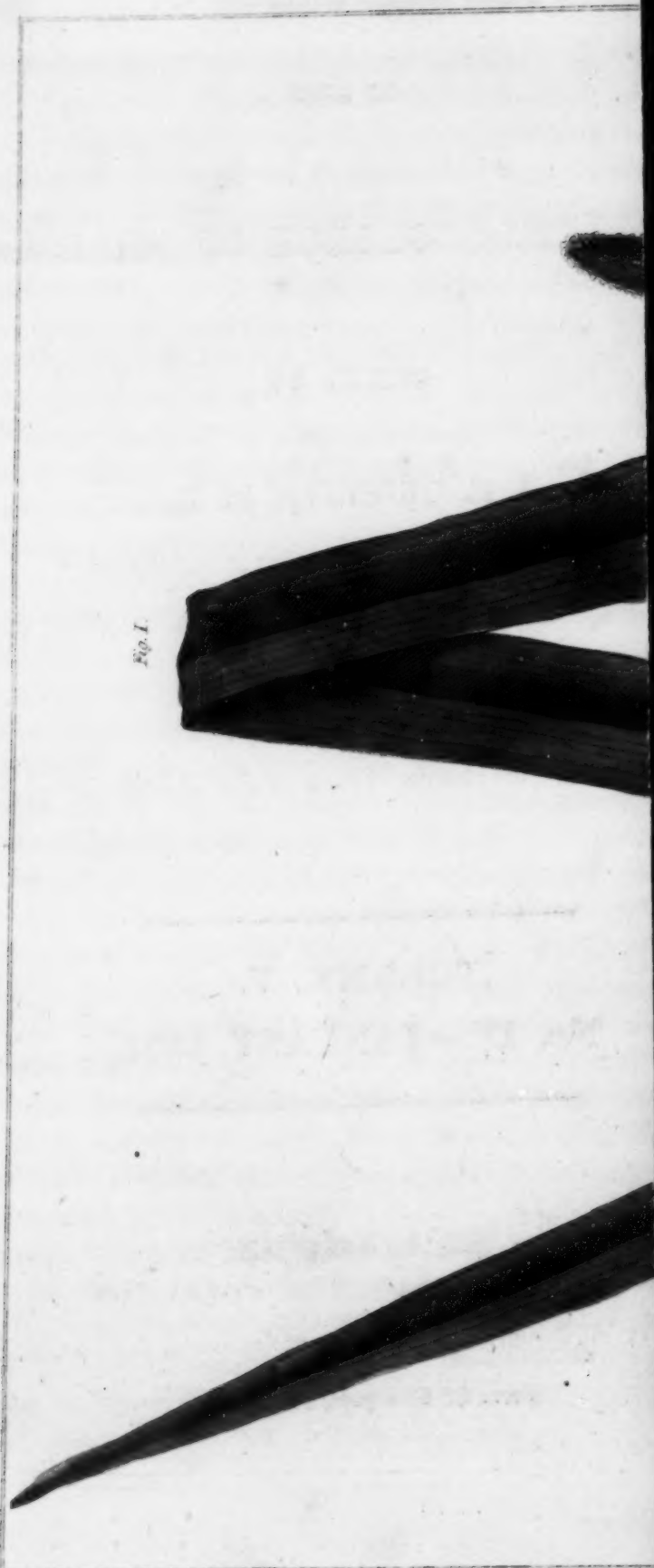


Fig. 1.

Table 24



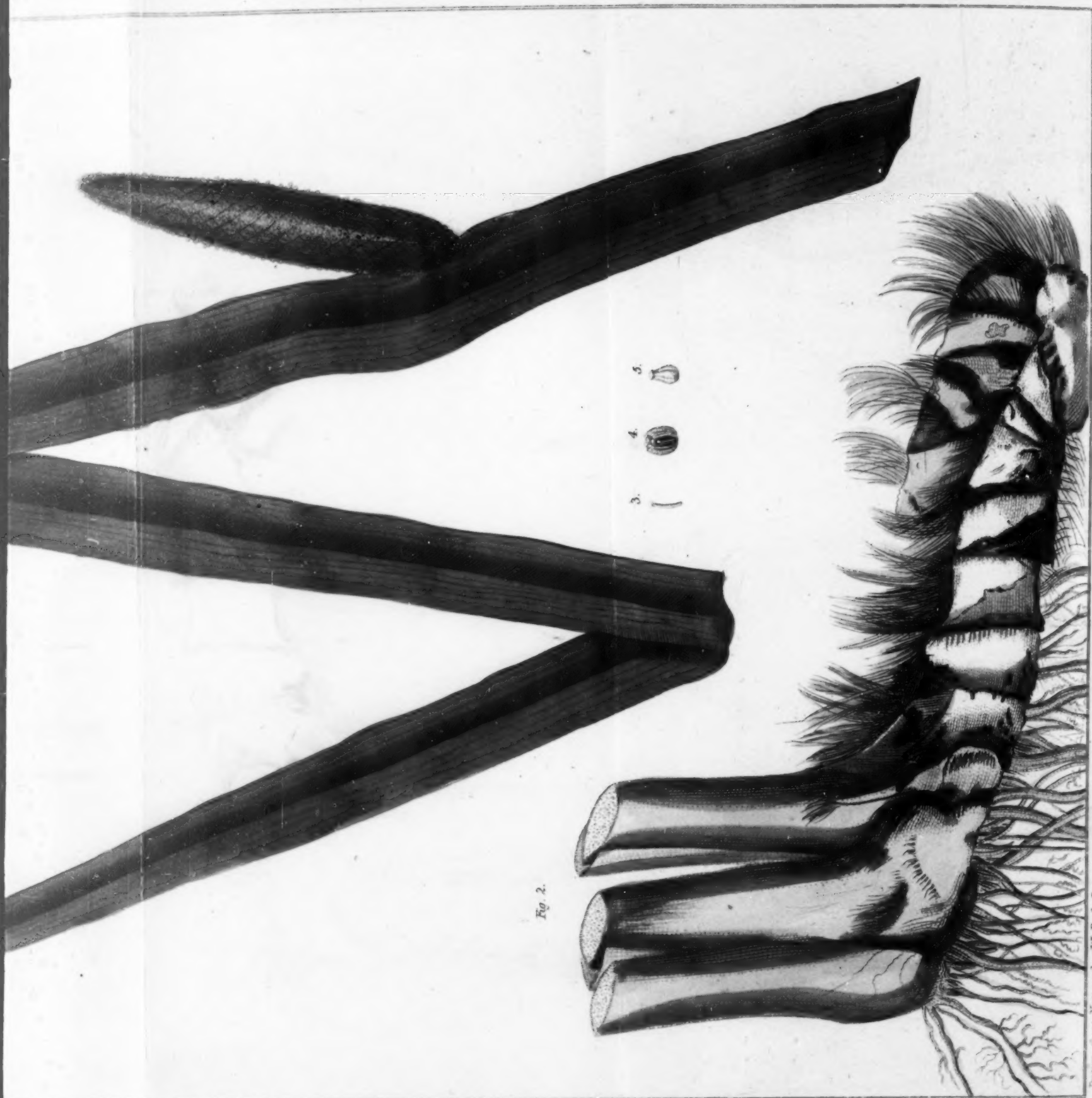


Fig. 2.

ACORUS CALAMUS.

[Sweetflag-Calamus.]

Drawn from Nature by W. P. C. Baron.

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